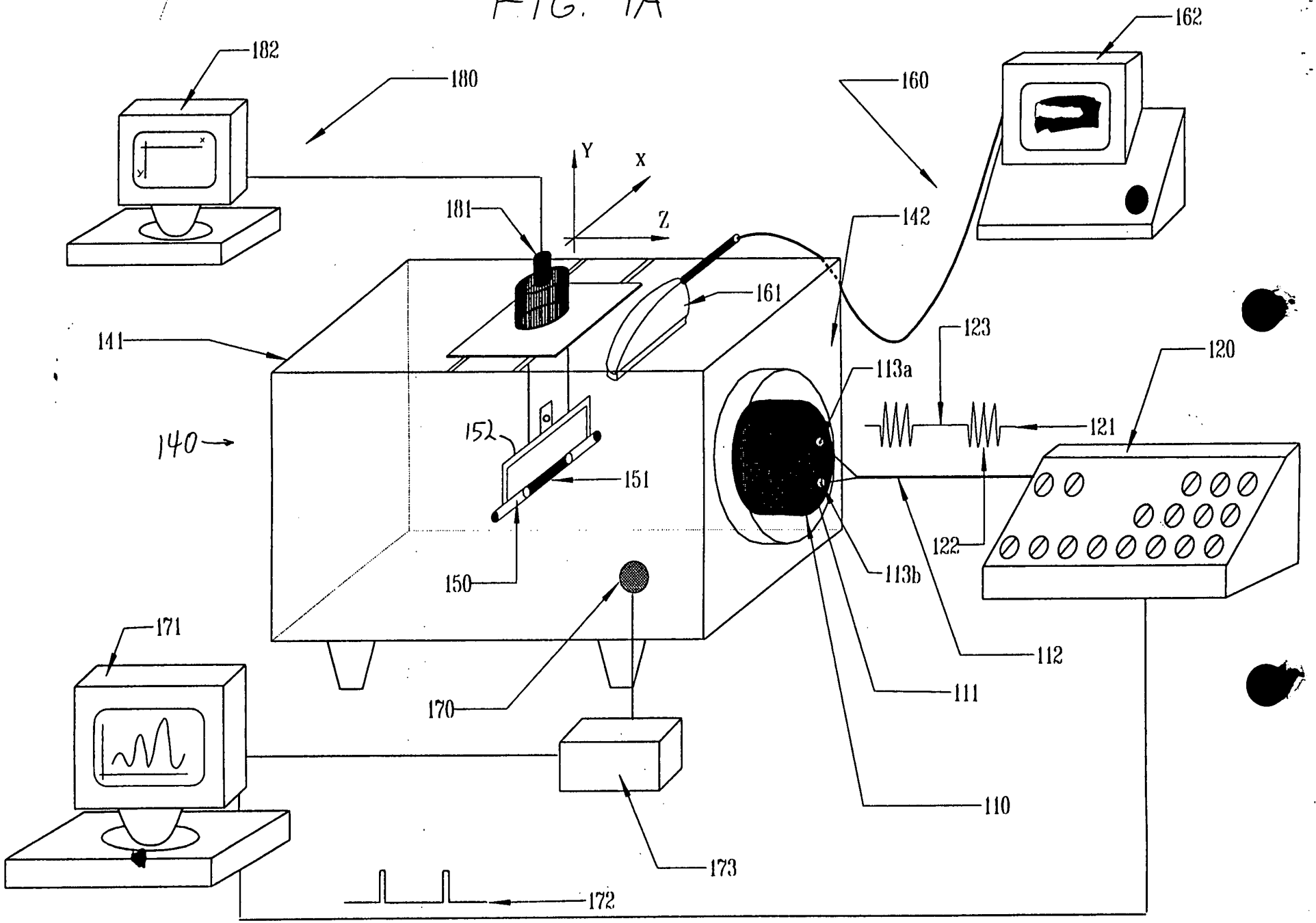
FIG. 1A


182
180
160
162
Y
X
Z
181
142
161
141
123
120
113a
140
152
121
151
122
150
113b
112
111
171
170
110
173
172

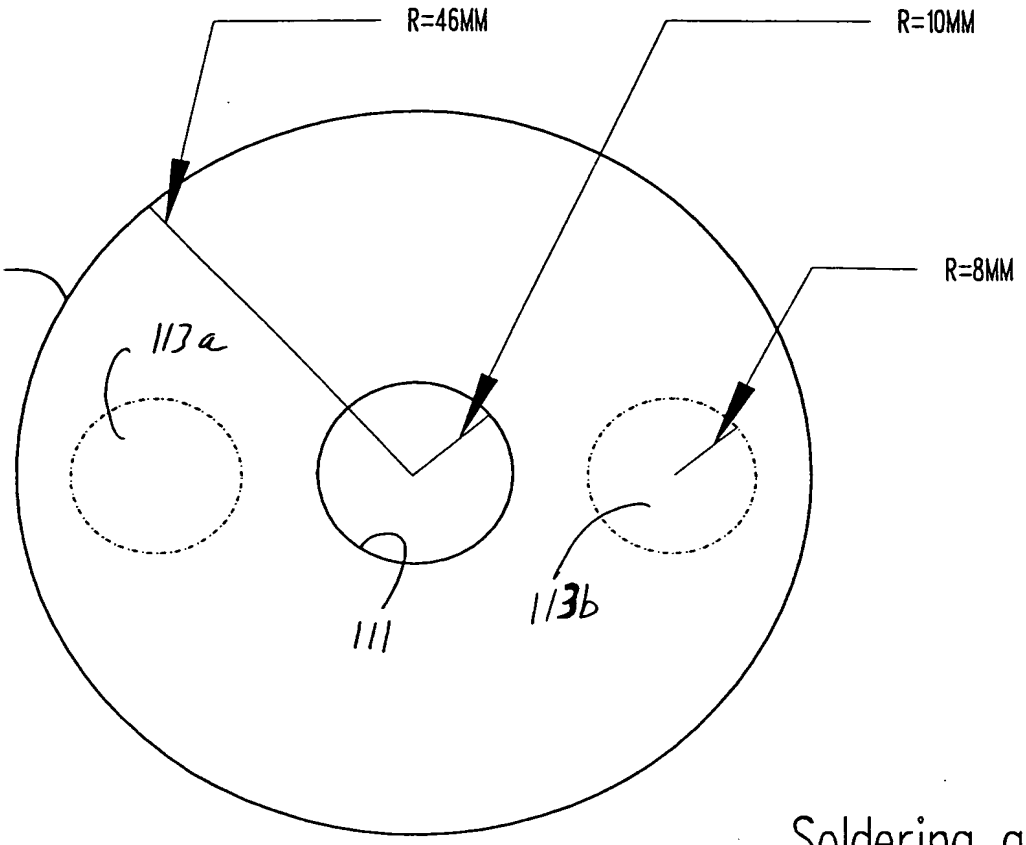

R=46MM
R=10MM
R=8MM
110
113a
113b
111

FIG. 1B

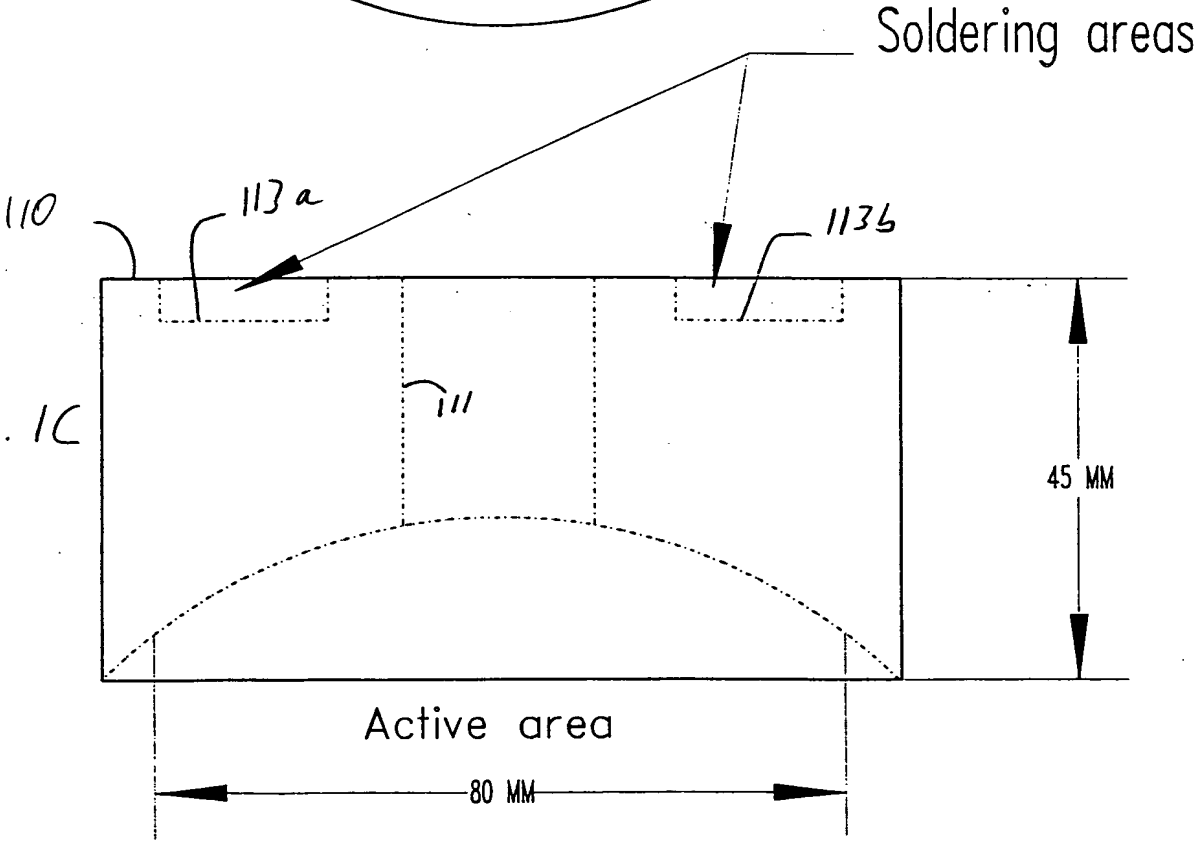

Soldering areas
110
113a
113b
111
45 MM
Active area
80 MM

FIG. 1C

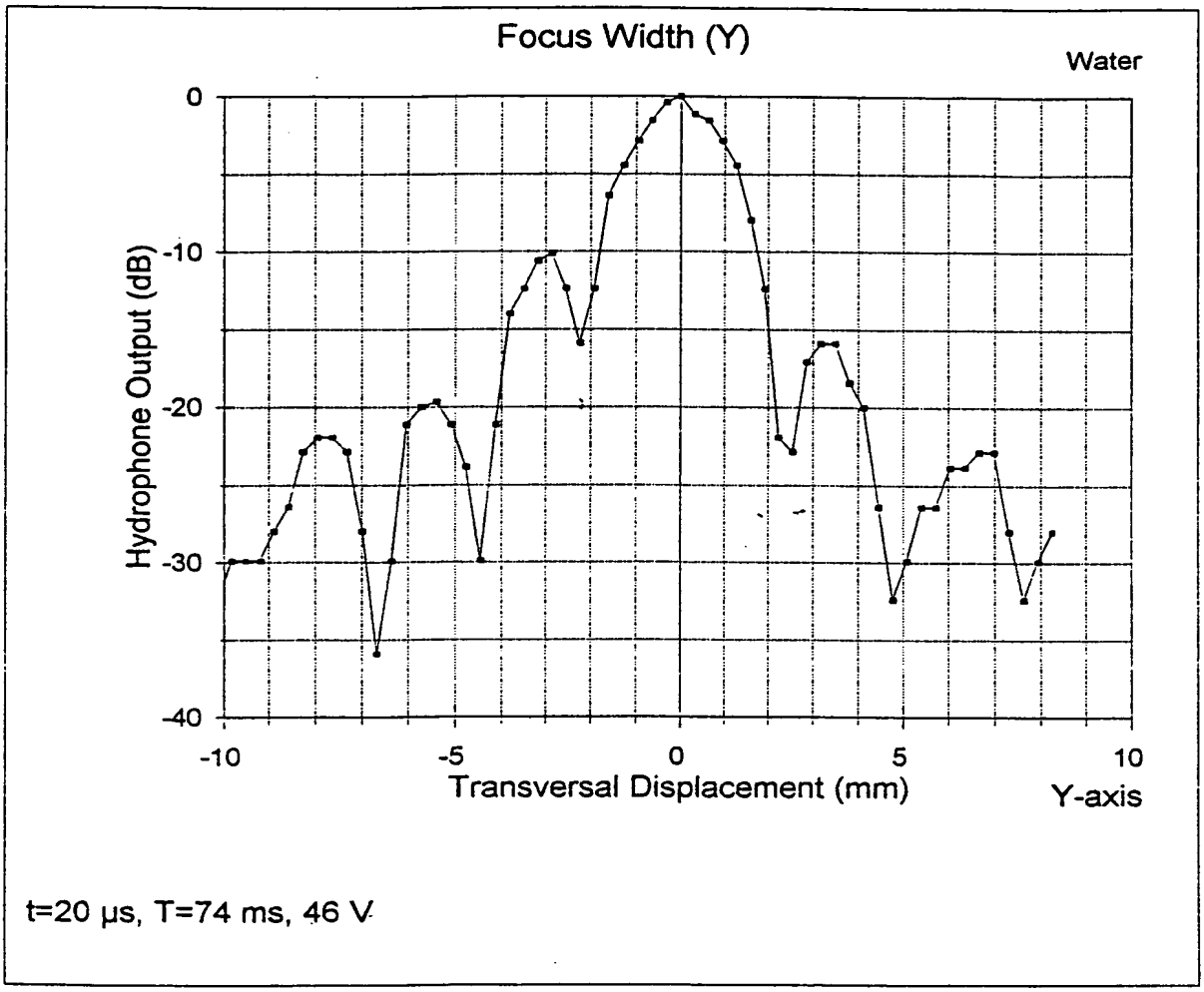

Focus Width (Y)
Water
0
-10
-20
-30
-40
Hydrophone Output (dB)
-10
-5
0
5
10
Transversal Displacement (mm)
Y-axis
t=20 µs, T=74 ms, 46 V

FIG. 2

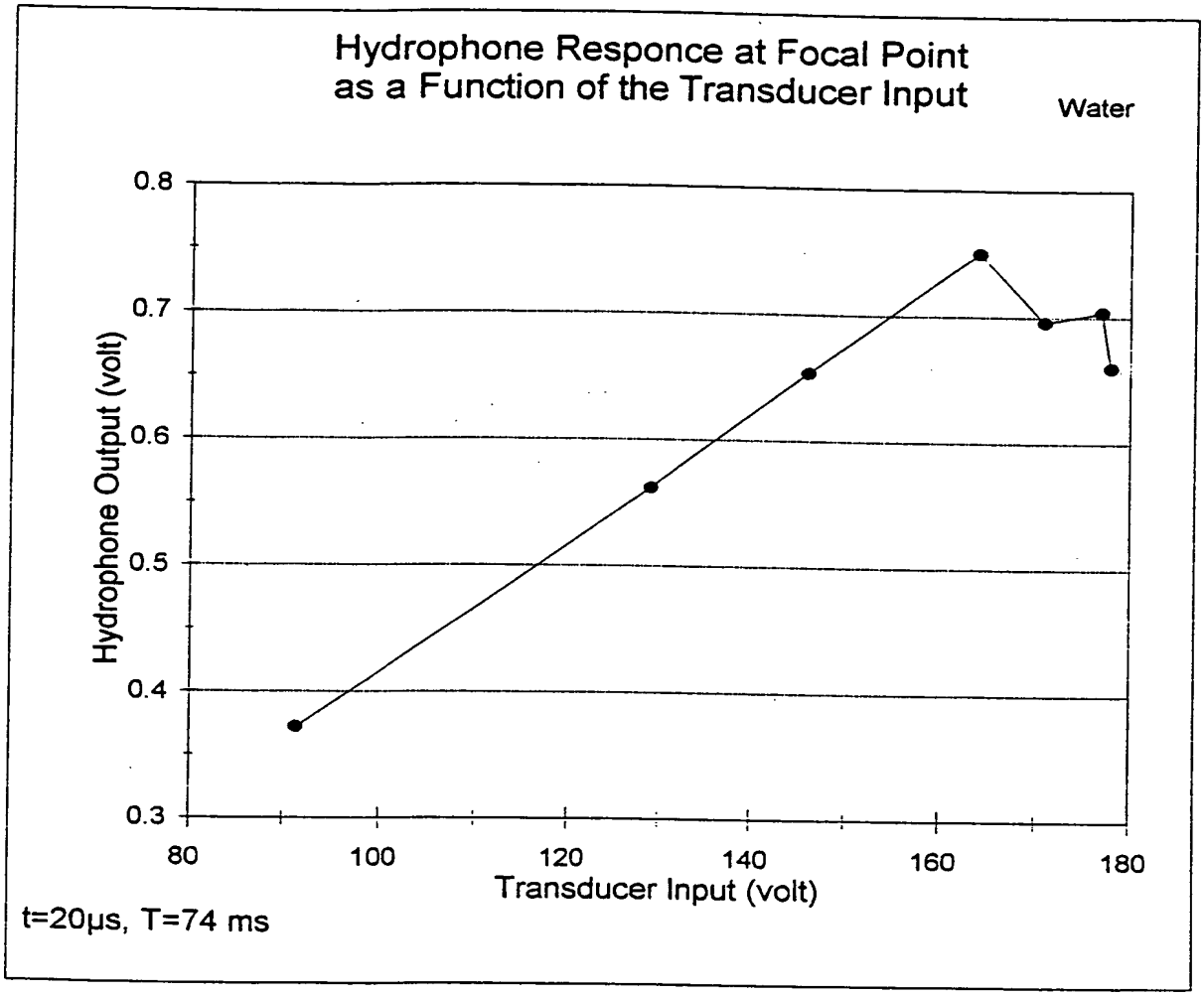

Hydrophone Responce at Focal Point
as a Function of the Transducer Input
Water
Hydrophone Output (volt)
0.8
0.7
0.6
0.5
0.4
0.3
80
100
120
140
160
180
Transducer Input (volt)
t=20μs, T=74 ms

FIG. 3

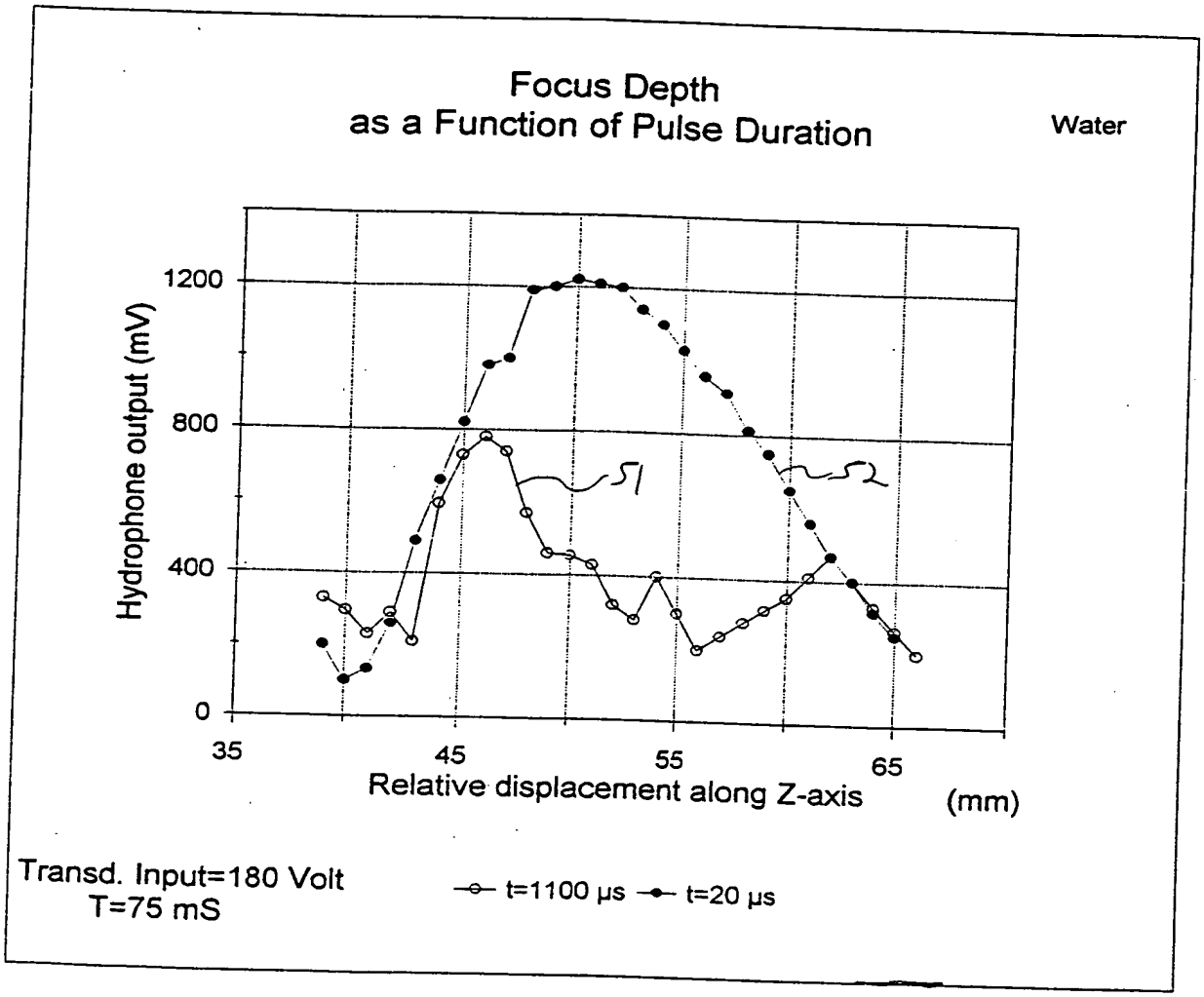

Focus Depth
as a Function of Pulse Duration
Water
Hydrophone output (mV)
1200
800
400
0
35
45
55
65
Relative displacement along Z-axis
(mm)
51
52
Transd. Input=180 Volt
T=75 mS
t=1100 µs
t=20 µs

FIG. 4

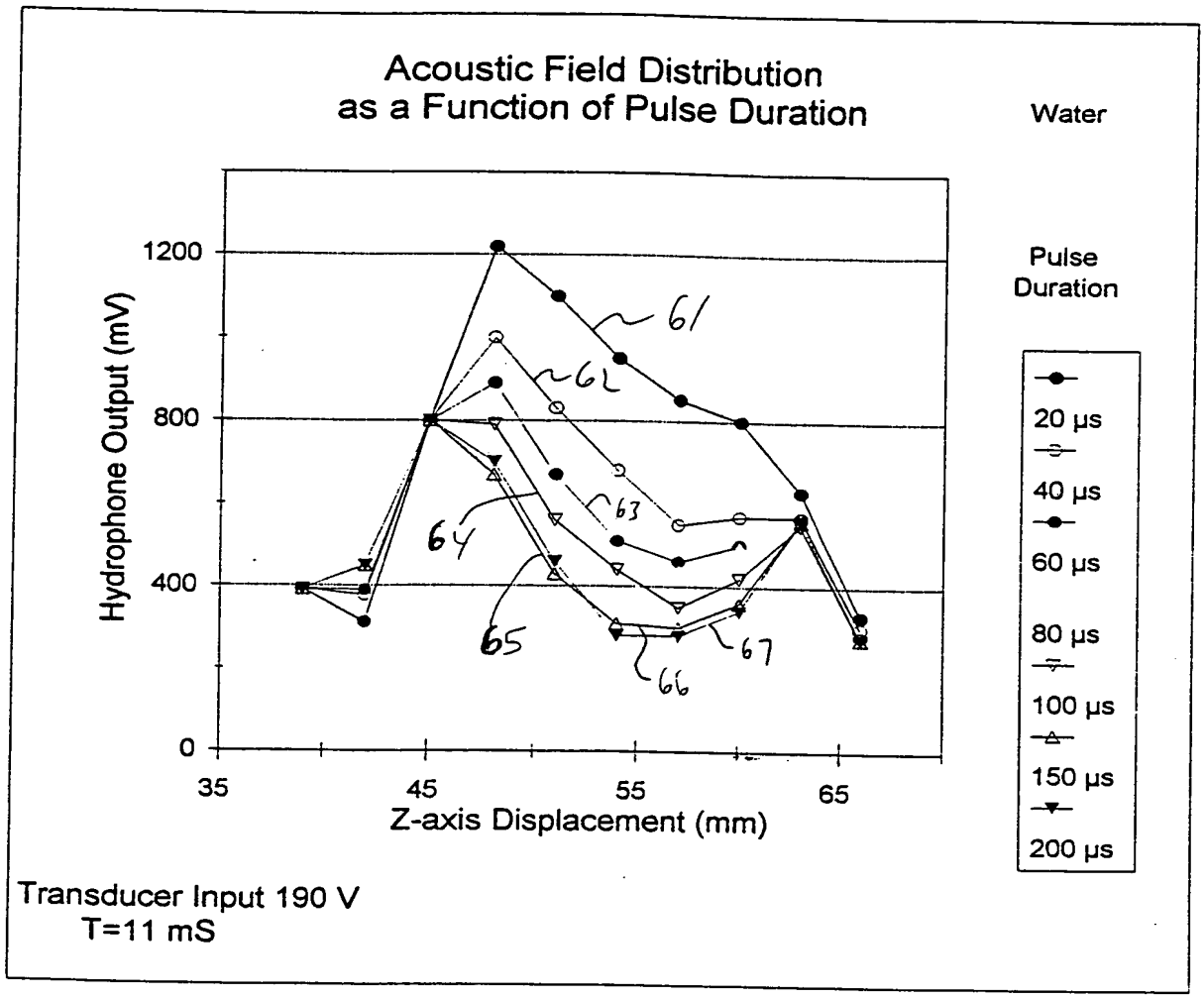

Acoustic Field Distribution
as a Function of Pulse Duration
Water
Hydrophone Output (mV)
1200
800
400
0
35
45
55
65
Z-axis Displacement (mm)
61
62
63
64
65
66
67
Pulse
Duration
20 µs
40 µs
60 µs
80 µs
100 µs
150 µs
200 µs
Transducer Input 190 V
T=11 mS

FIG. 5

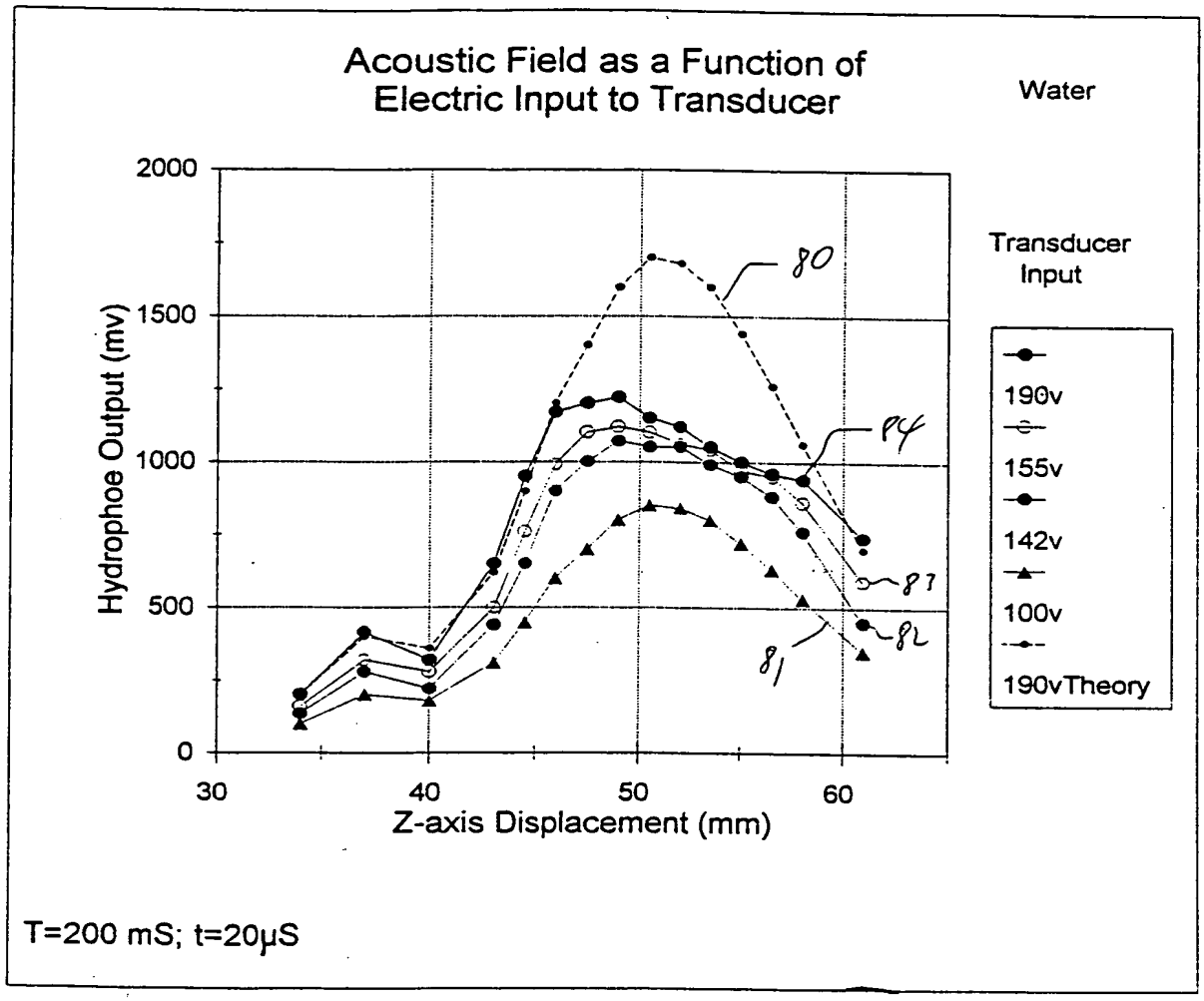

Acoustic Field as a Function of
Electric Input to Transducer
Water
Transducer
Input
190v
155v
142v
100v
190vTheory
Hydrophoe Output (mv)
2000
1500
1000
500
0
30
40
50
60
Z-axis Displacement (mm)
80
84
87
82
81
T=200 mS; t=20μS

FIG. 6

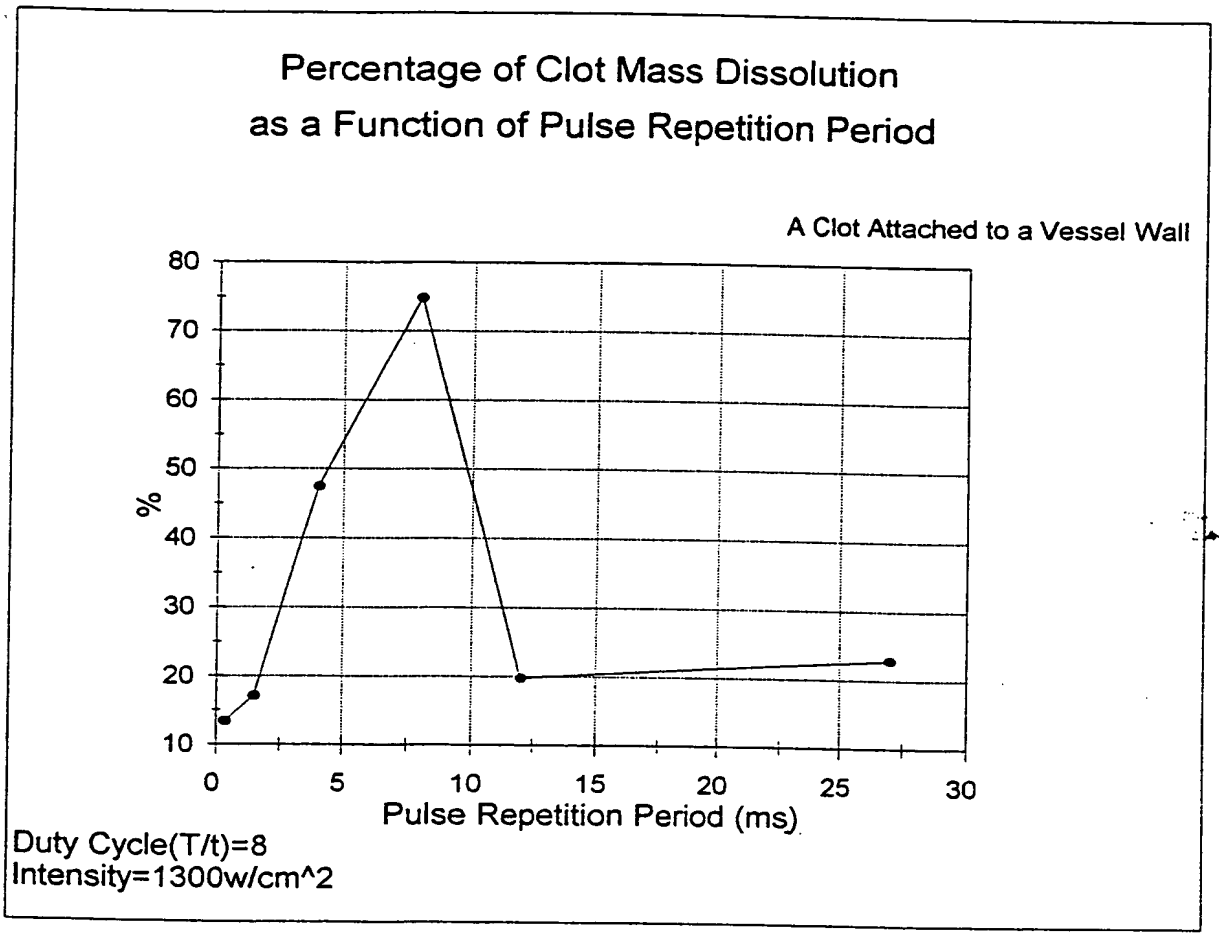

Percentage of Clot Mass Dissolution
as a Function of Pulse Repetition Period
A Clot Attached to a Vessel Wall
80
70
60
50
40
30
20
10
%
0
5
10
15
20
25
30
Pulse Repetition Period (ms)
Duty Cycle(T/t)=8
Intensity=1300w/cm^2

FIG. 7

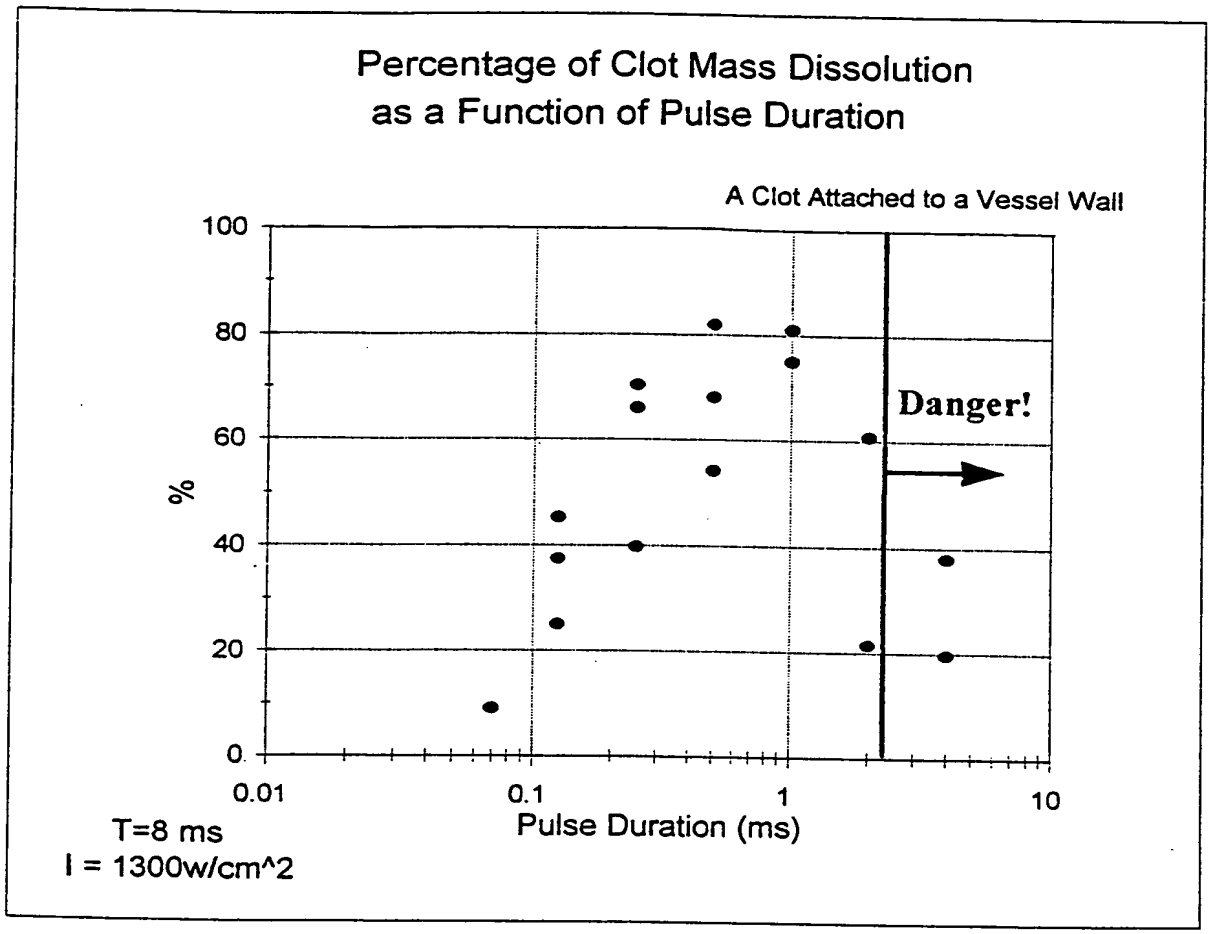

Percentage of Clot Mass Dissolution
as a Function of Pulse Duration
A Clot Attached to a Vessel Wall
100
80
60
40
20
0
%
Danger!
0.01
0.1
1
10
Pulse Duration (ms)
T=8 ms
I = 1300w/cm^2

FIG. 8

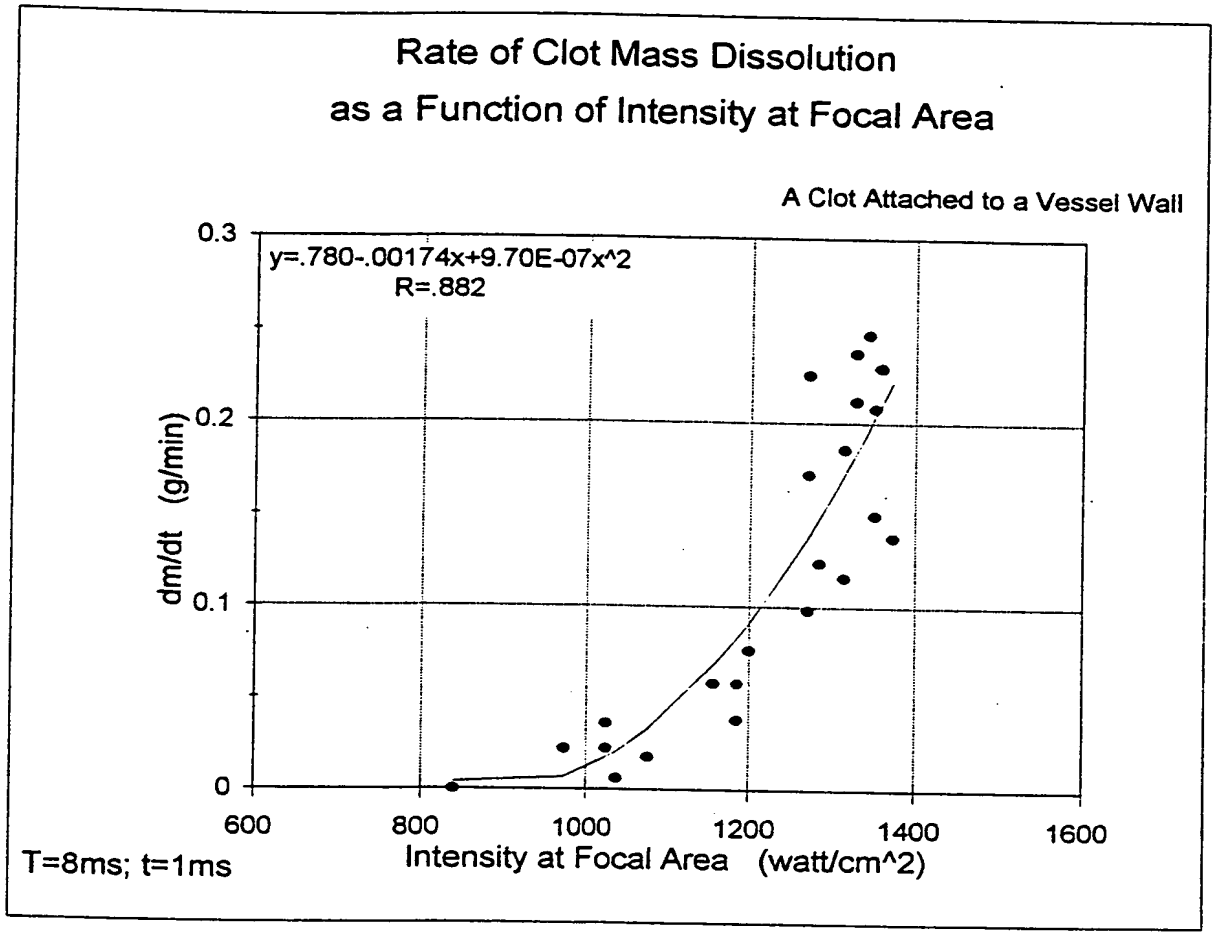

Rate of Clot Mass Dissolution
as a Function of Intensity at Focal Area
A Clot Attached to a Vessel Wall
y=.780-.00174x+9.70E-07x^2
R=.882
dm/dt (g/min)
0.3
0.2
0.1
0
600
800
1000
1200
1400
1600
Intensity at Focal Area (watt/cm^2)
T=8ms; t=1ms

FIG. 9

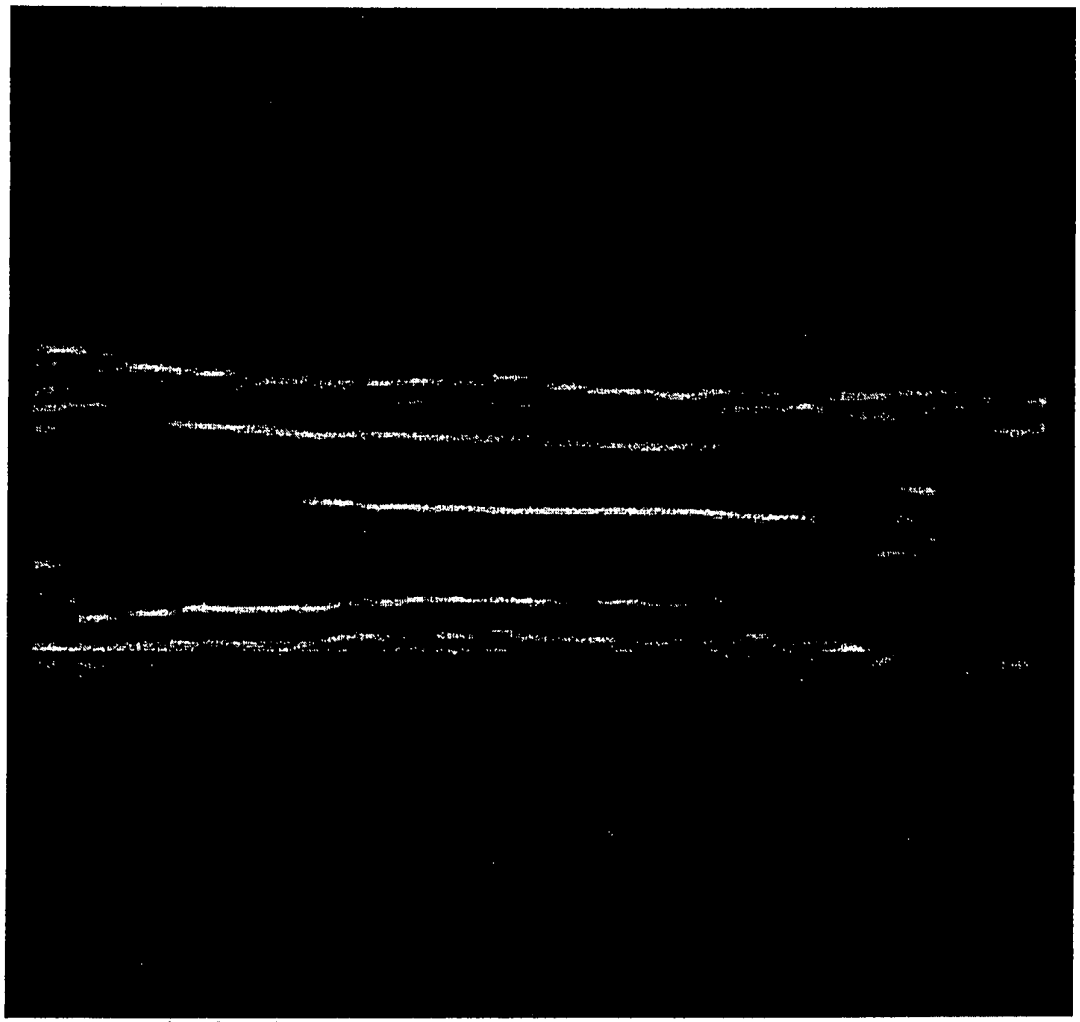


FIG. 10A

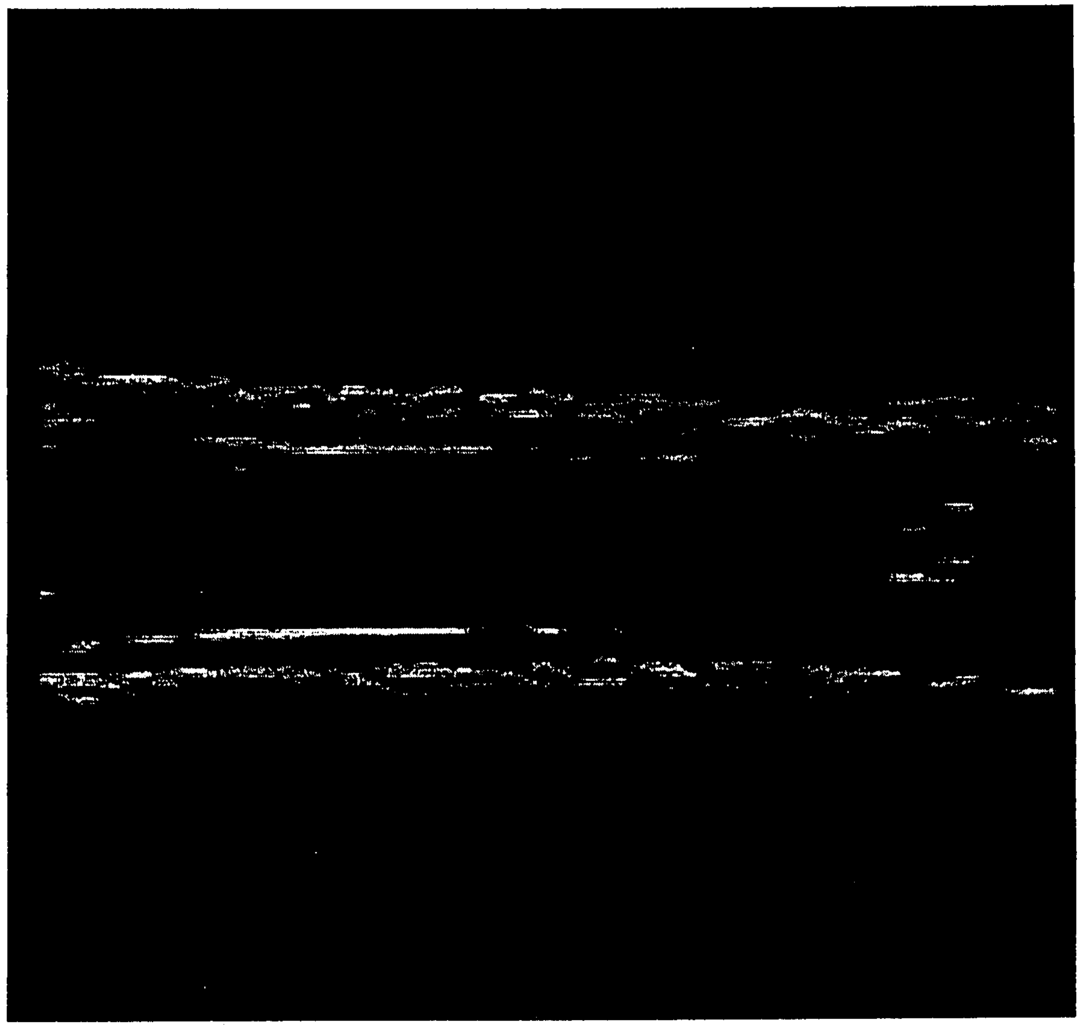


FIG. 10B

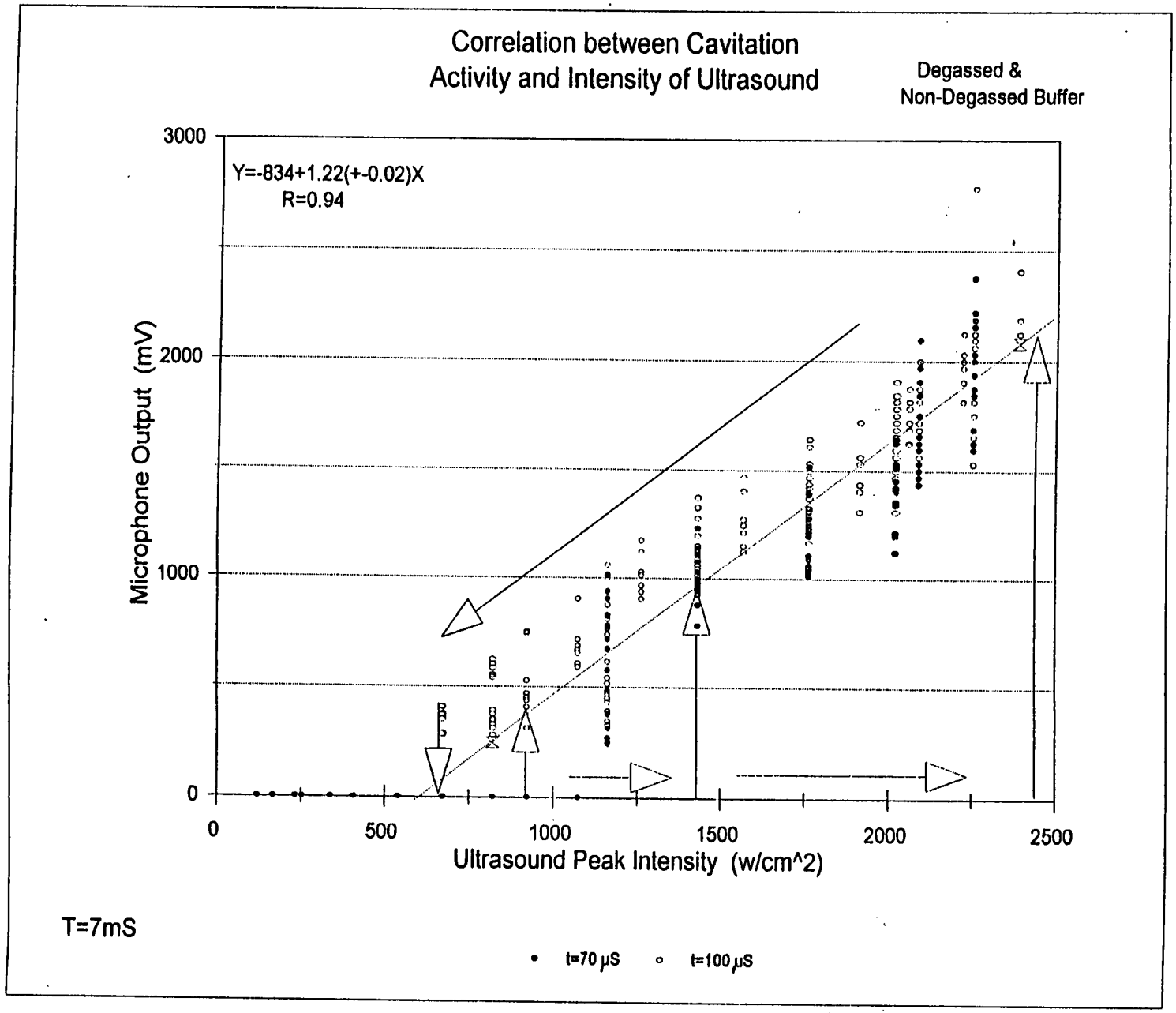

Correlation between Cavitation
Activity and Intensity of Ultrasound
Degassed &
Non-Degassed Buffer
Y=-834+1.22(+-0.02)X
R=0.94
Microphone Output (mV)
3000
2000
1000
0
0
500
1000
1500
2000
2500
Ultrasound Peak Intensity (w/cm^2)
T=7mS
t=70 µS
t=100 µS

FIG. 11

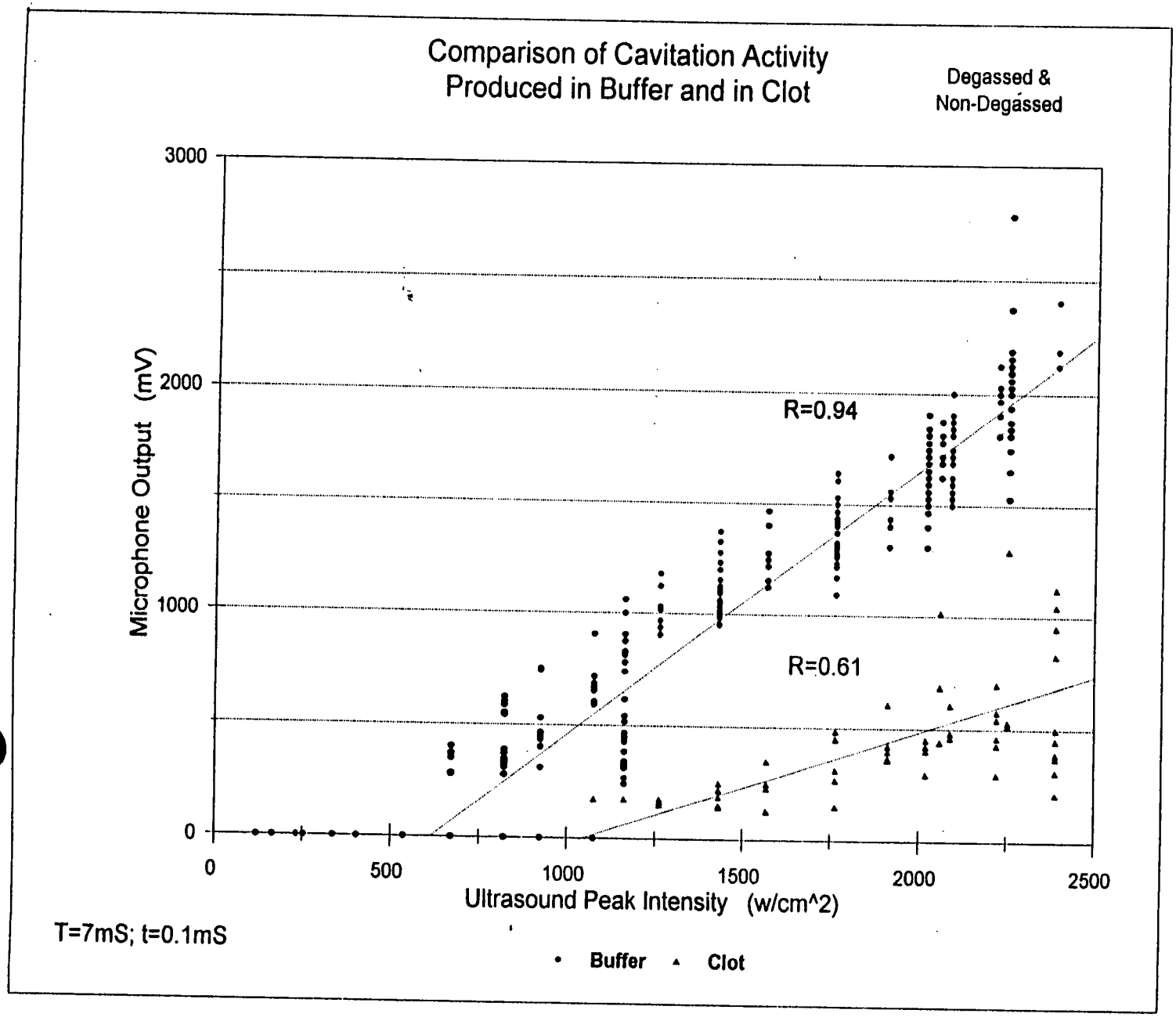

Comparison of Cavitation Activity
Produced in Buffer and in Clot
Degassed &
Non-Degassed
3000
2000
1000
0
Microphone Output (mV)
R=0.94
R=0.61
0
500
1000
1500
2000
2500
Ultrasound Peak Intensity (w/cm^2)
T=7mS; t=0.1mS
Buffer
Clot

FIG. 12

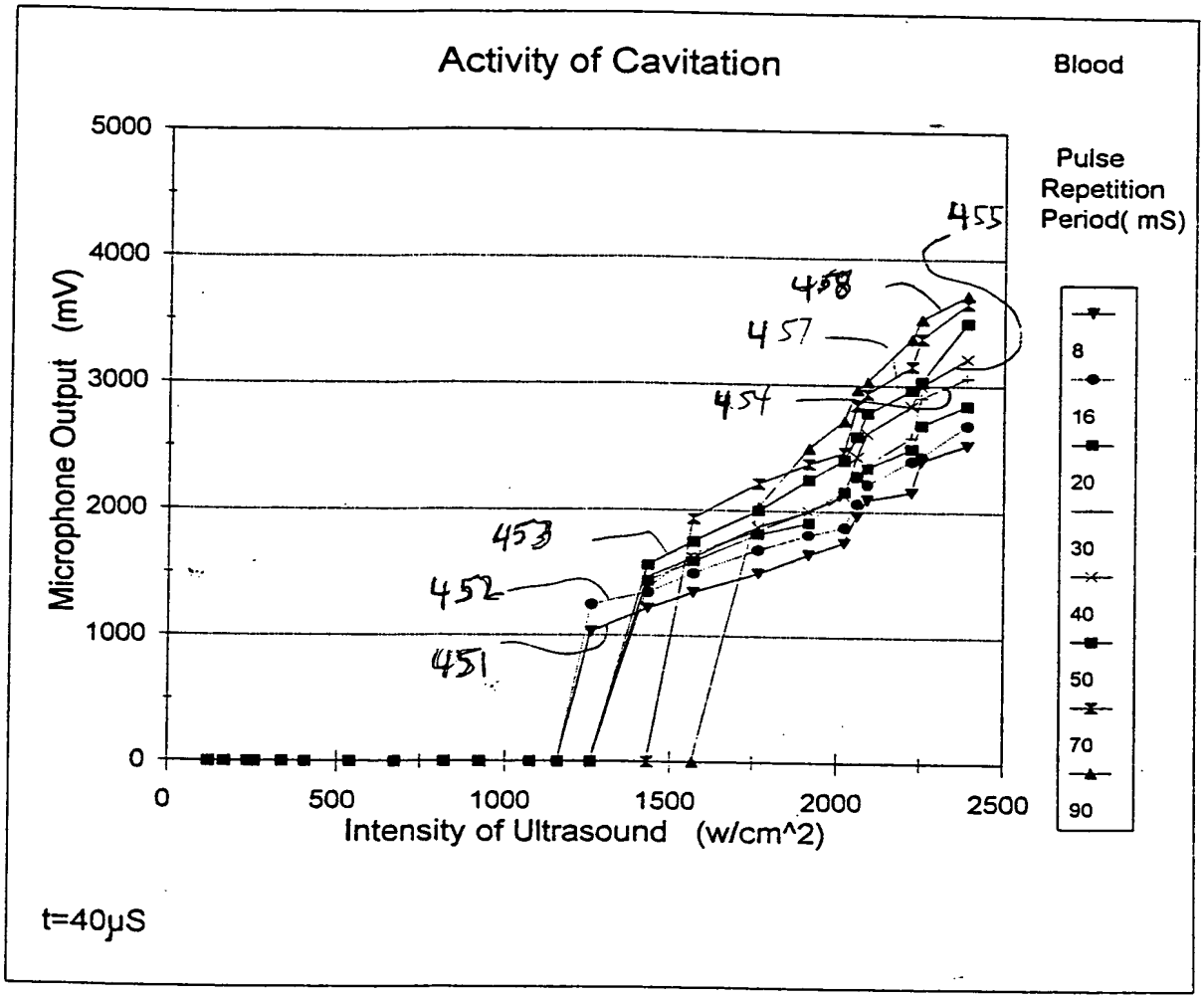

Activity of Cavitation
Blood
Pulse Repetition Period(mS)
8
16
20
30
40
50
70
90
455
458
457
454
453
452
451
Microphone Output (mV)
5000
4000
3000
2000
1000
0
0
500
1000
1500
2000
2500
Intensity of Ultrasound (w/cm^2)
t=40μS

FIG. 13

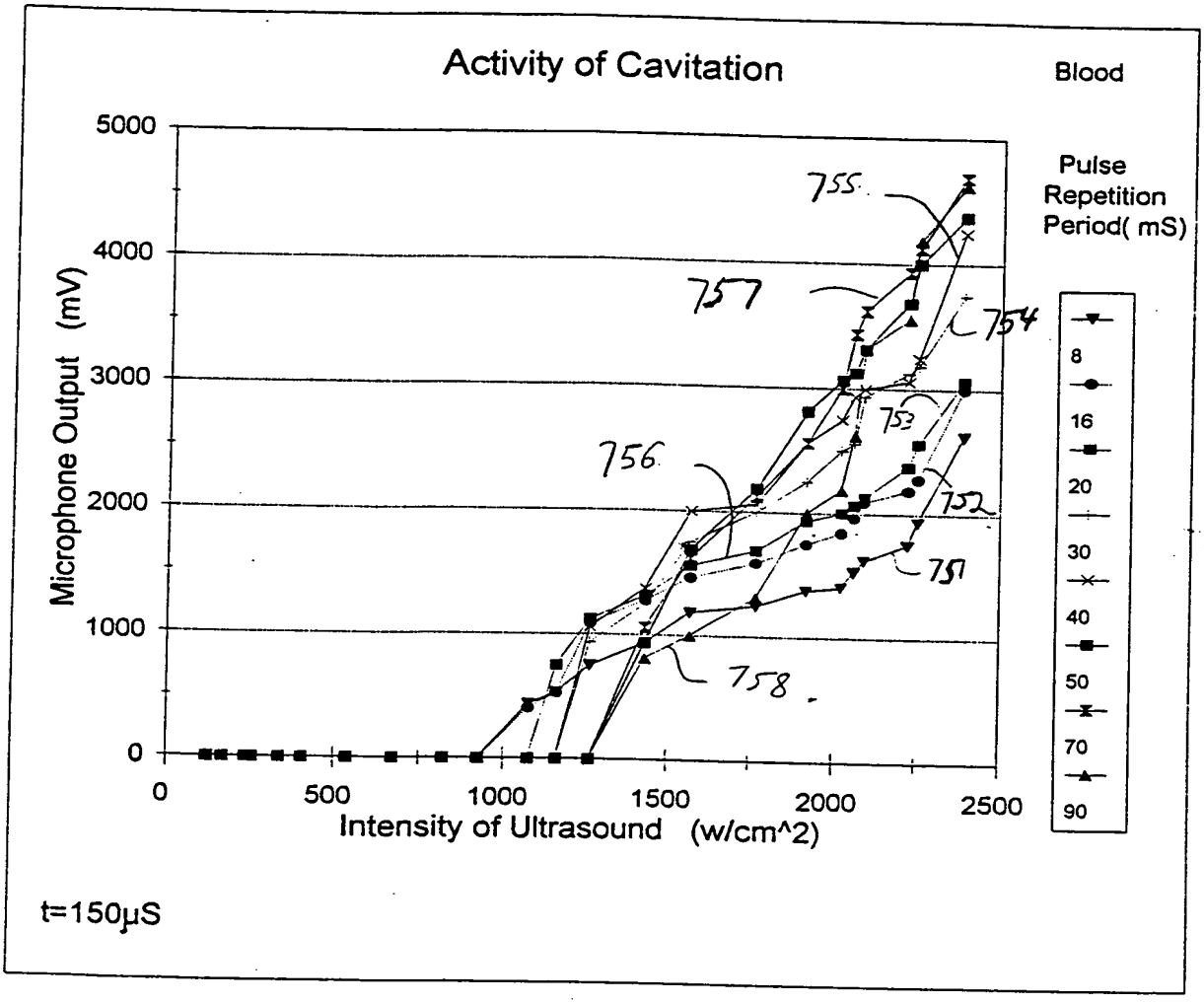

Activity of Cavitation
Blood
Pulse Repetition Period(mS)
8
16
20
30
40
50
70
90
Microphone Output (mV)
5000
4000
3000
2000
1000
0
0
500
1000
1500
2000
2500
Intensity of Ultrasound (w/cm^2)
755
757
754
753
756
752
751
758
t=150µS

FIG. 14

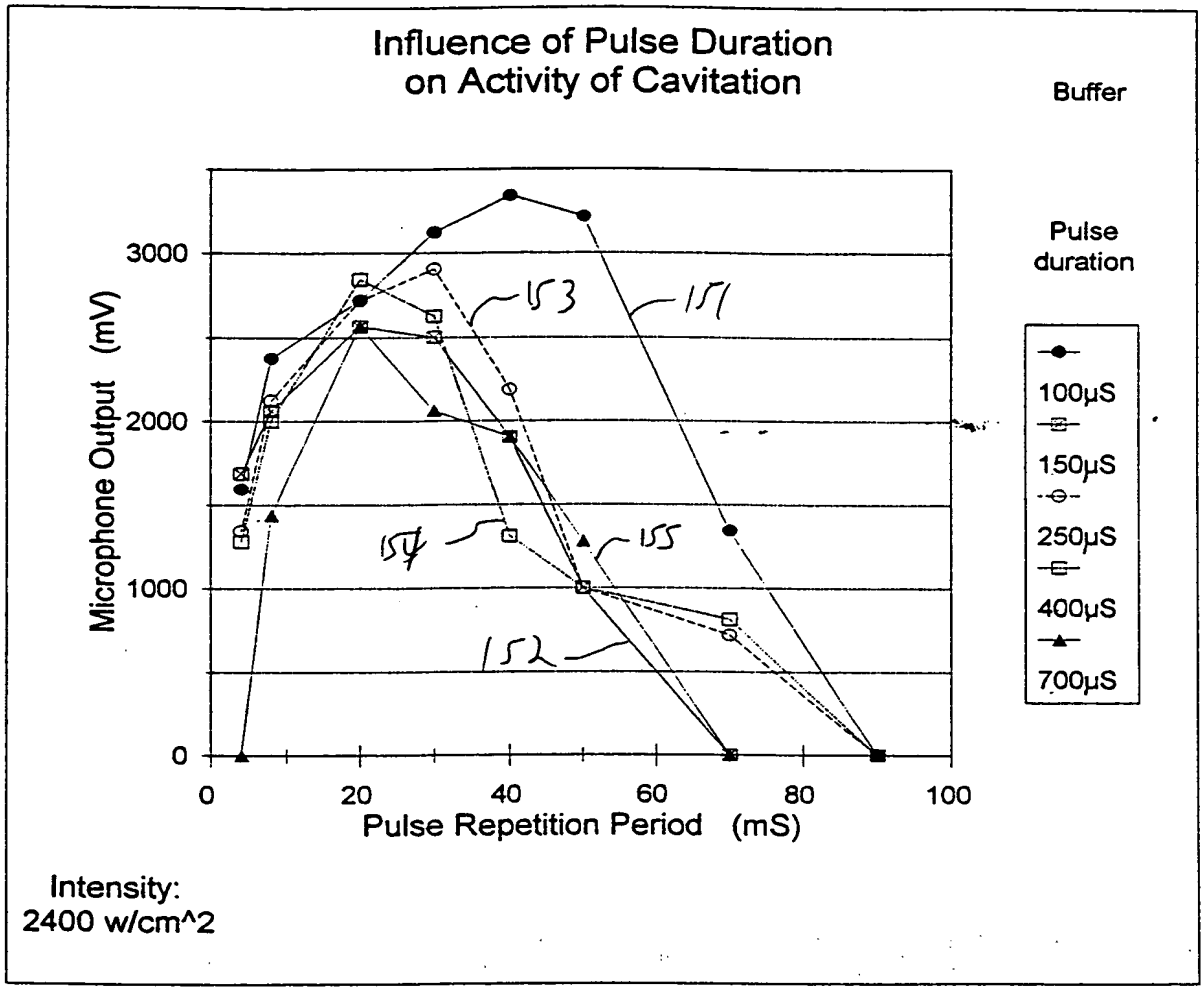

Influence of Pulse Duration
on Activity of Cavitation
Buffer
Pulse duration
100µS
150µS
250µS
400µS
700µS
Microphone Output (mV)
3000
2000
1000
0
0
20
40
60
80
100
Pulse Repetition Period (mS)
153
151
154
155
152
Intensity:
2400 w/cm^2

FIG. 15

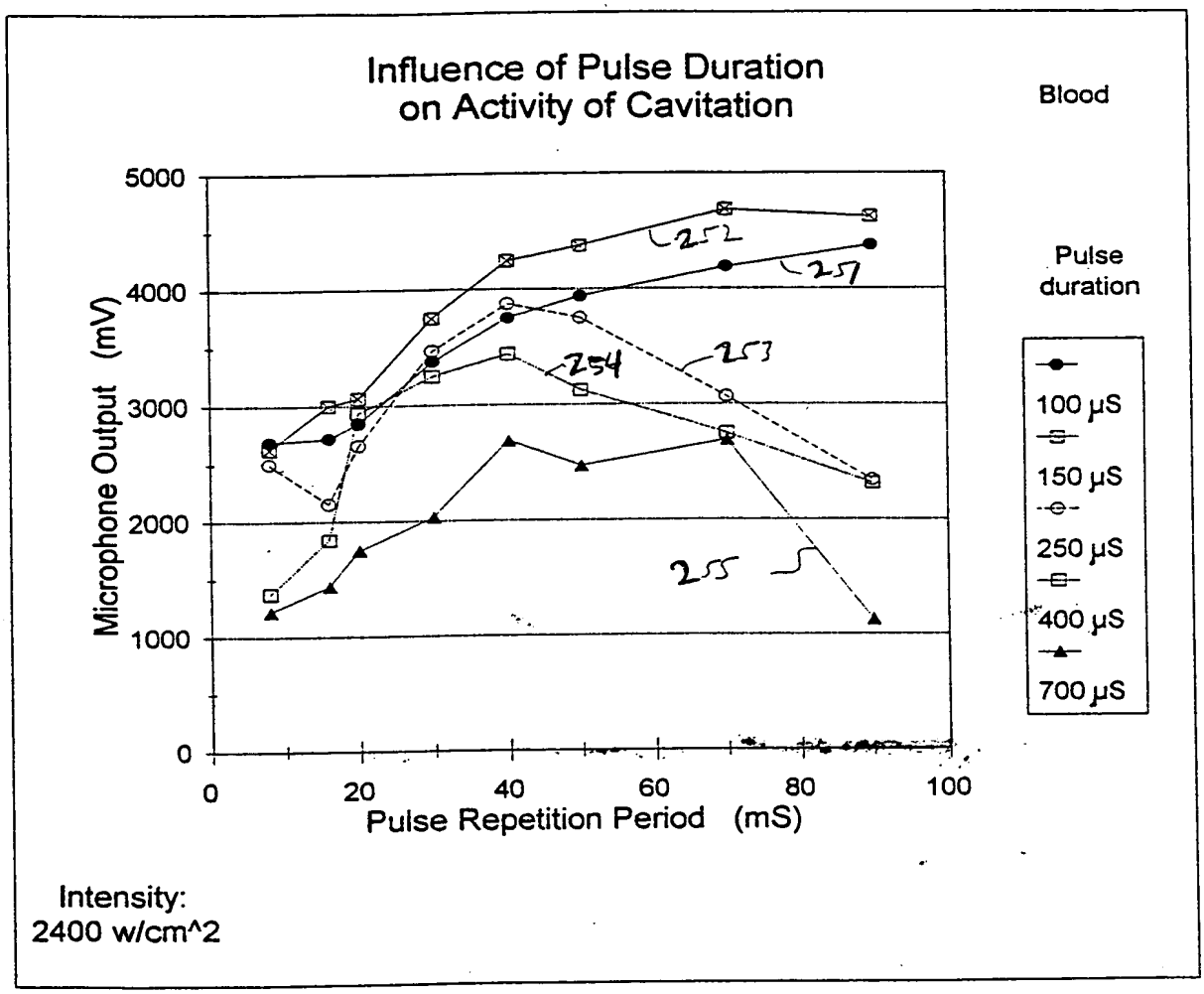

Influence of Pulse Duration
on Activity of Cavitation
Blood
Microphone Output (mV)
5000
4000
3000
2000
1000
0
0
20
40
60
80
100
Pulse Repetition Period (mS)
252
257
253
254
255
Pulse duration
100 µS
150 µS
250 µS
400 µS
700 µS
Intensity:
2400 w/cm^2

FIG. 16

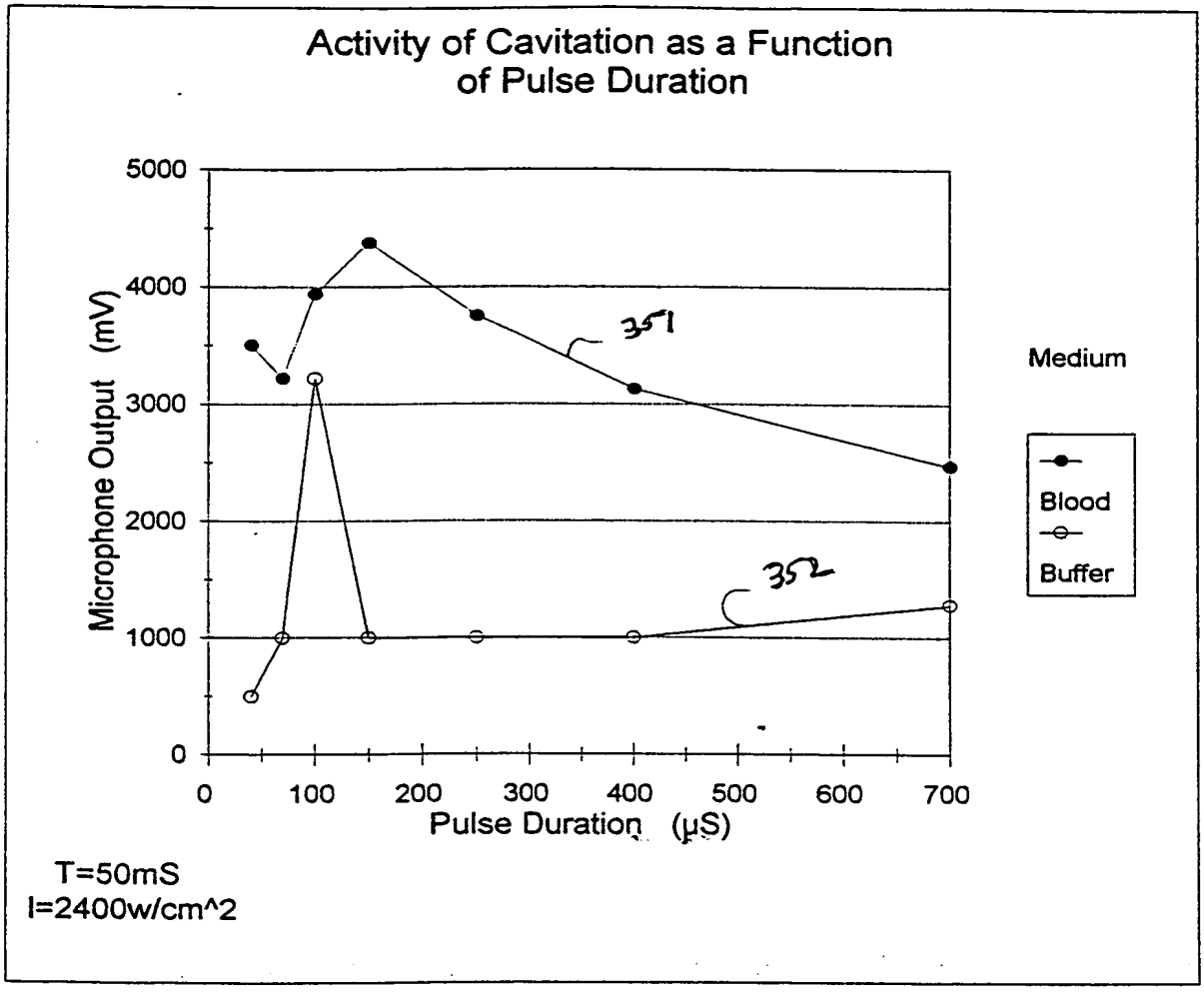

Activity of Cavitation as a Function of Pulse Duration
Microphone Output (mV)
5000
4000
3000
2000
1000
0
0
100
200
300
400
500
600
700
Pulse Duration (μS)
351
352
Medium
Blood
Buffer
T=50mS
I=2400w/cm^2

FIG. 17

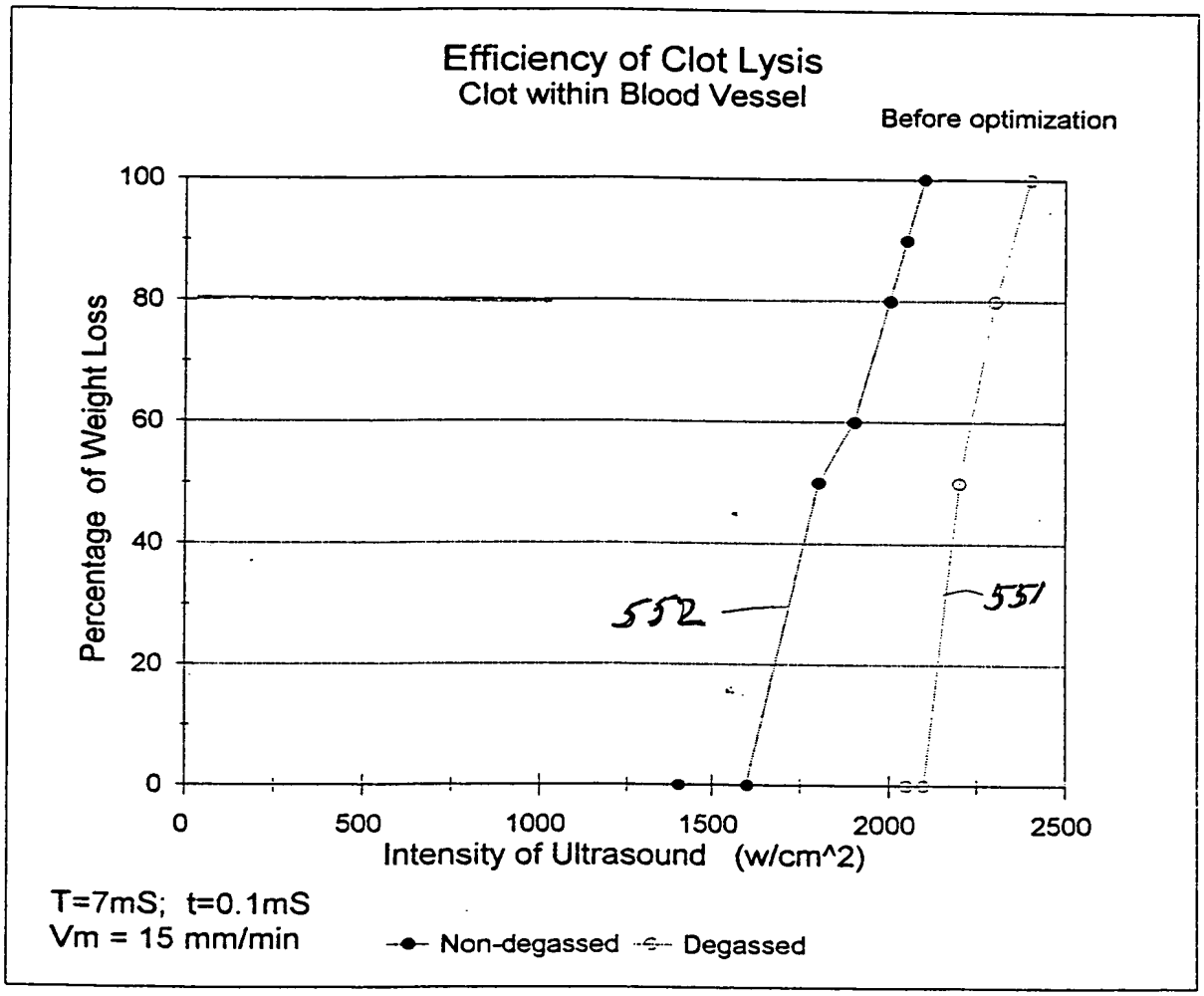

Efficiency of Clot Lysis
Clot within Blood Vessel
Before optimization
Percentage of Weight Loss
100
80
60
40
20
0
0
500
1000
1500
2000
2500
Intensity of Ultrasound (w/cm^2)
552
551
T=7mS; t=0.1mS
Vm = 15 mm/min
Non-degassed
Degassed

FIG. 18

Search for optimum time parameters
of pulsed mode sonification

Clot within blood vessel

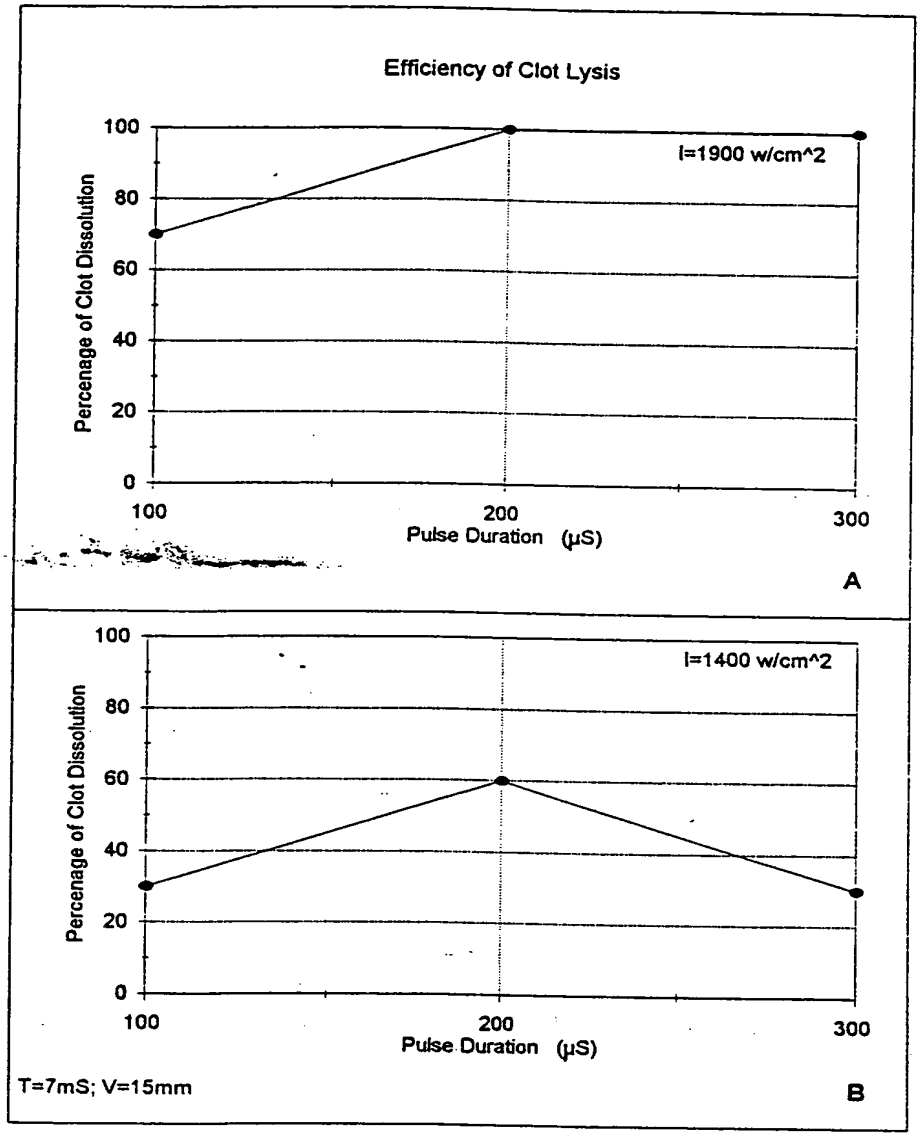


FIG. 19A

FIG. 19B

Search for optimum time parameters
of pulsed mode sonification

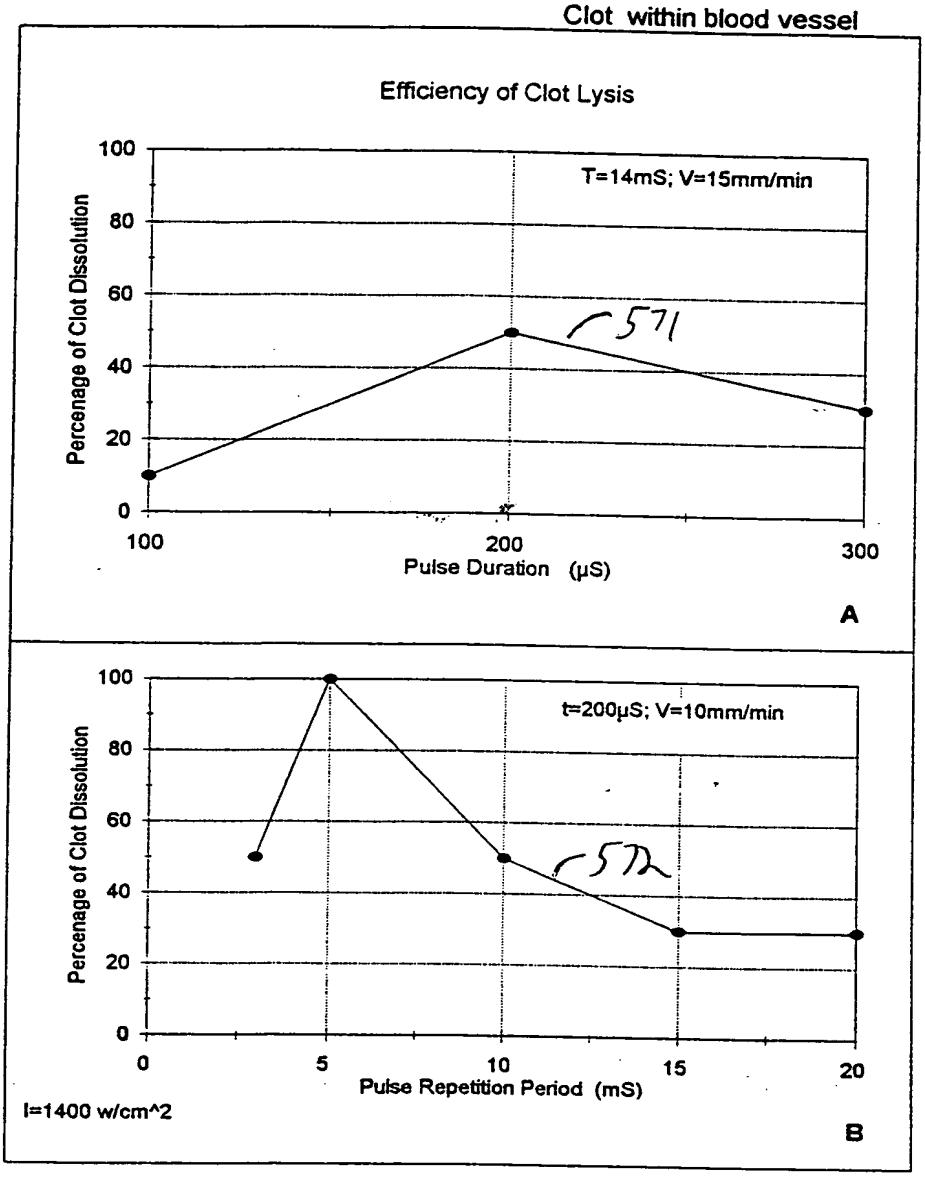


FIG. 20A

FIG. 20B

Search for optimum time parameters
of pulsed mode sonification

Clot within blood vessel

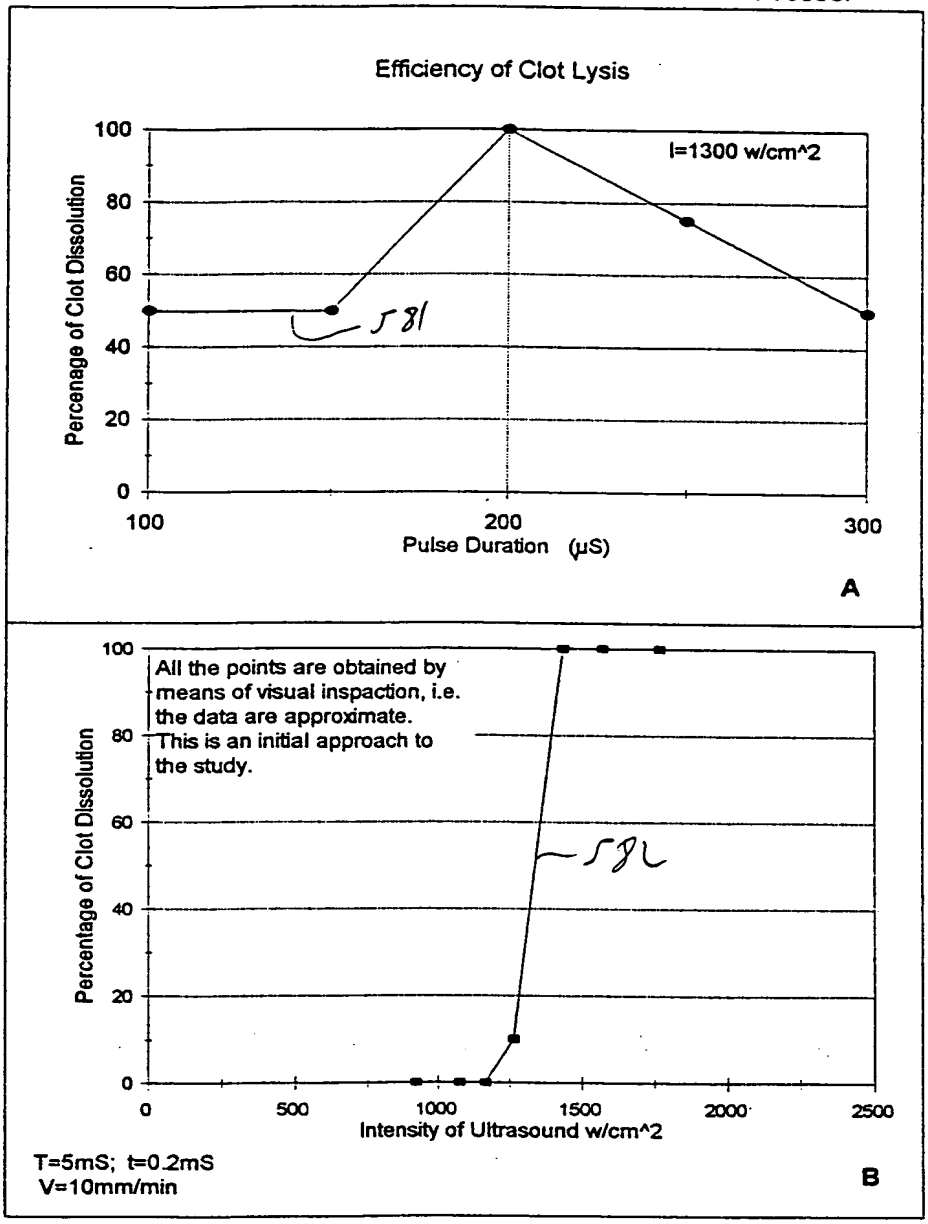


FIG. 20C

FIG. 21

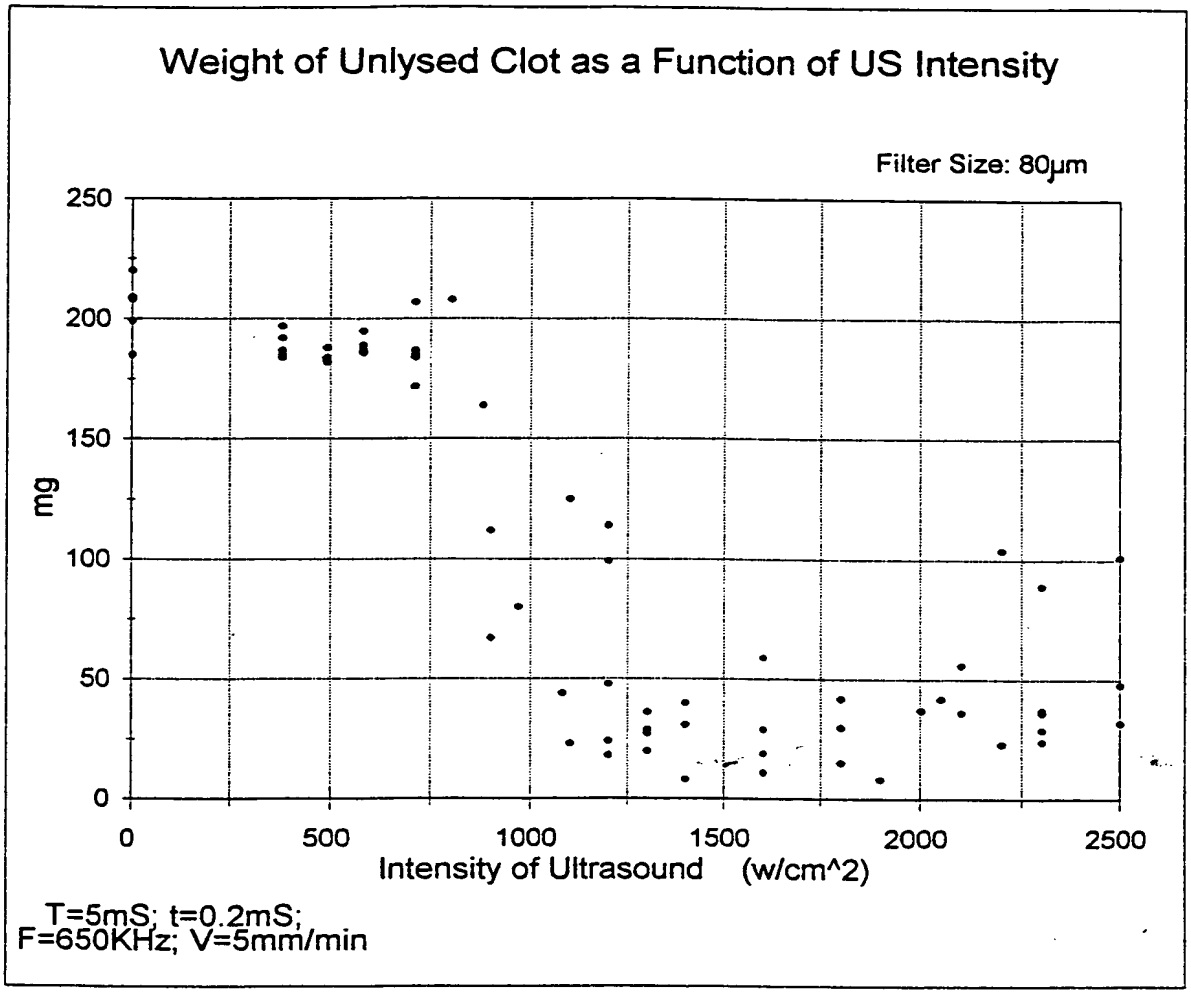
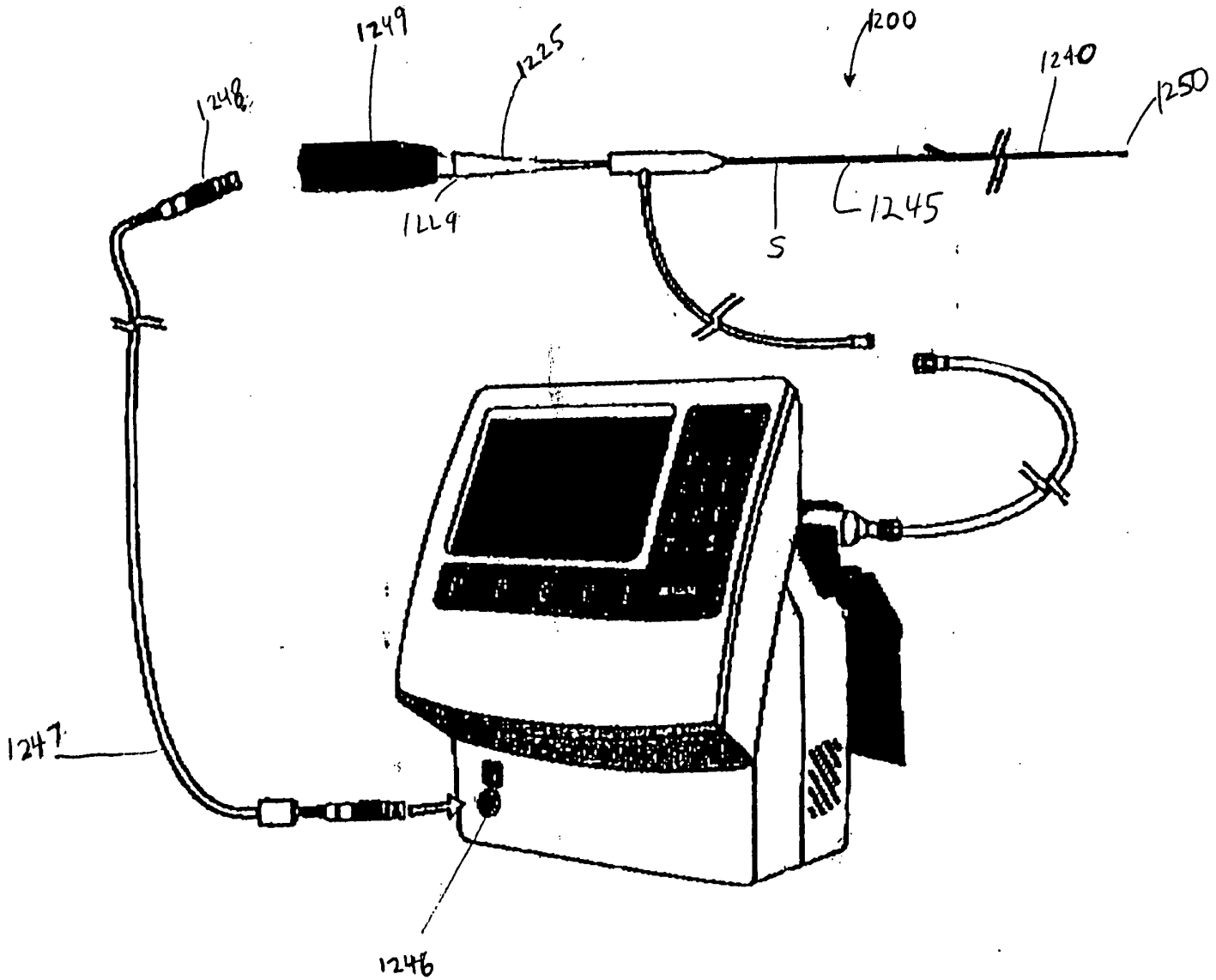

Weight of Unlysed Clot as a Function of US Intensity
Filter Size: 80µm
250
200
150
100
50
0
mg
0
500
1000
1500
2000
2500
Intensity of Ultrasound (w/cm^2)
T=5mS; t=0.2mS;
F=650KHz; V=5mm/min

FIG. 22

FIG. 23



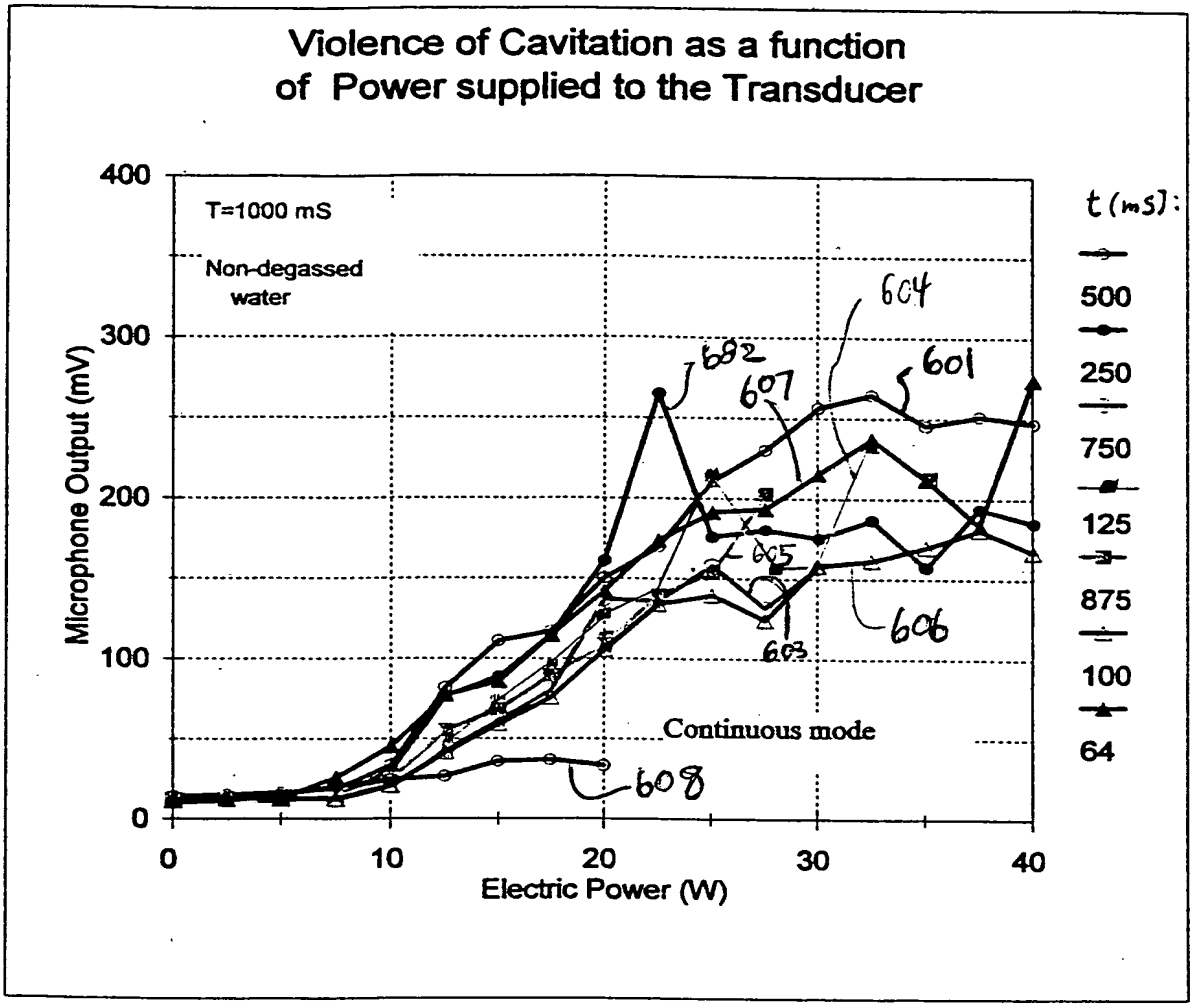

Violence of Cavitation as a function
of Power supplied to the Transducer
T=1000 mS
Non-degassed
water
Microphone Output (mV)
Electric Power (W)
Continuous mode
t (mS):
500
250
750
125
875
100
64
601
602
603
604
605
606
607
608
0
100
200
300
400
0
10
20
30
40

FIG. 24

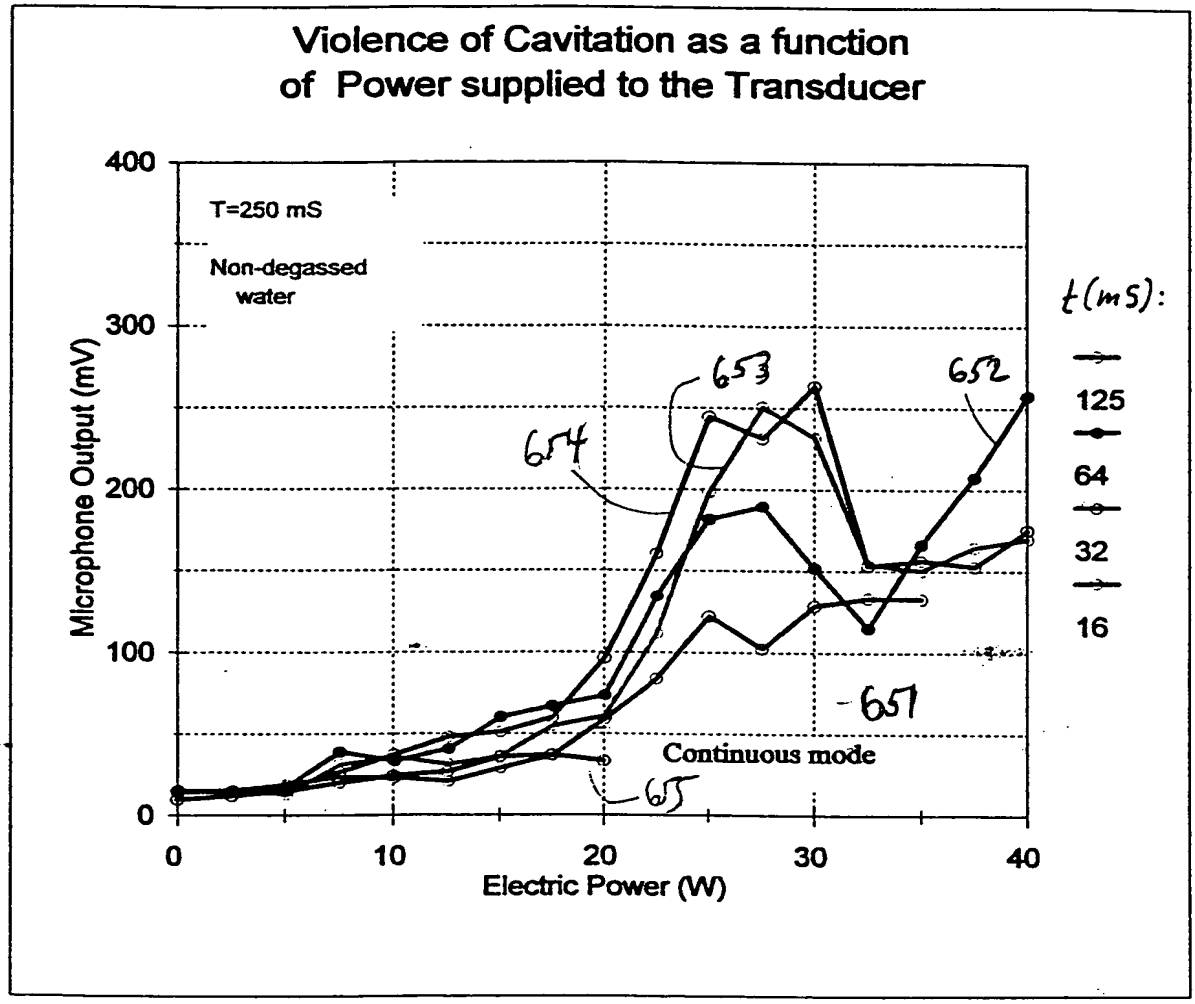

Violence of Cavitation as a function
of Power supplied to the Transducer
T=250 mS
Non-degassed
water
Microphone Output (mV)
Electric Power (W)
0
100
200
300
400
0
10
20
30
40
653
652
654
651
655
Continuous mode
t(mS):
125
64
32
16

FIG. 25

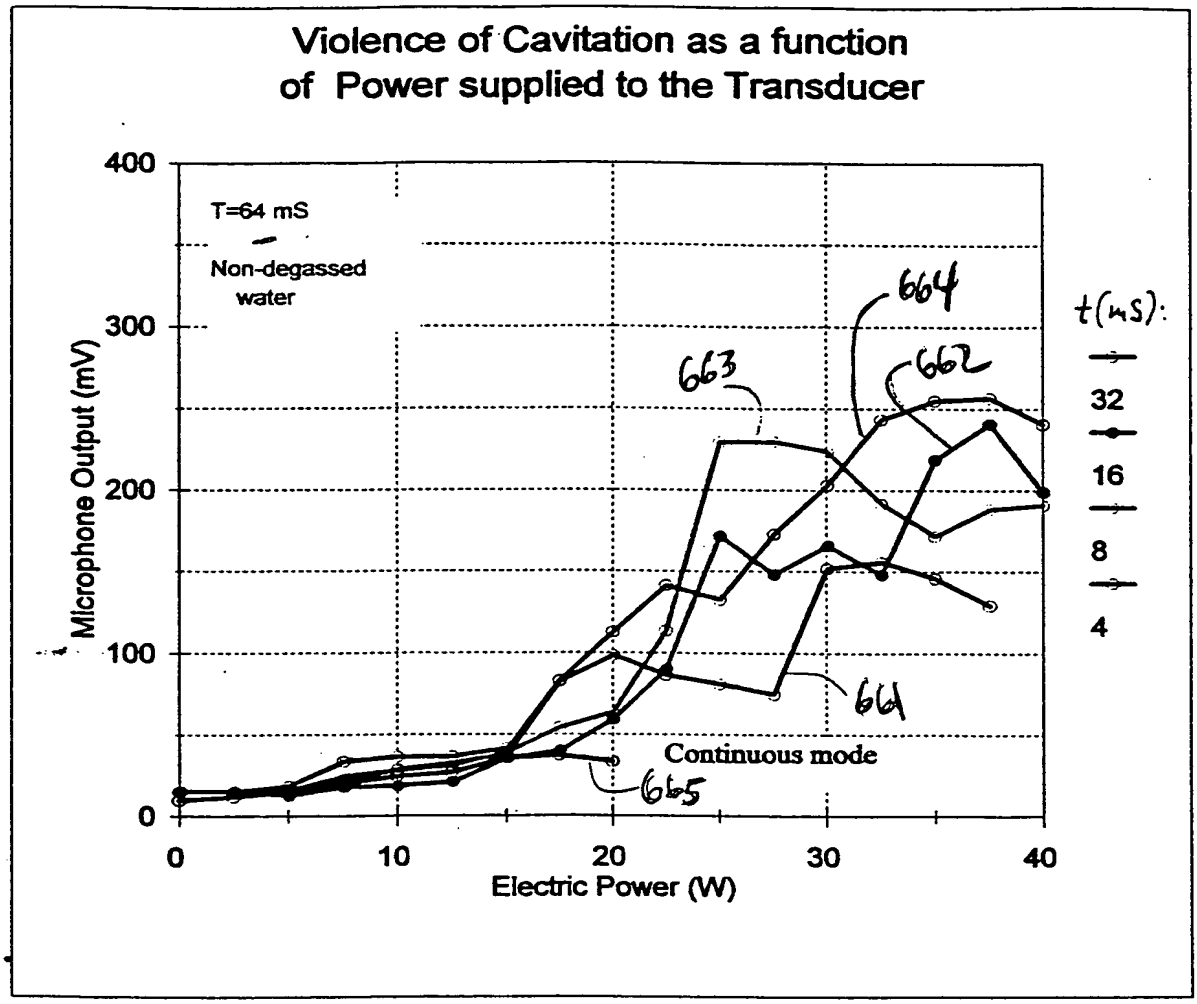

Violence of Cavitation as a function of Power supplied to the Transducer
T=64 mS
Non-degassed water
Microphone Output (mV)
Electric Power (W)
400
300
200
100
0
0
10
20
30
40
664
663
662
661
665
Continuous mode
t(mS):
32
16
8
4

FIG. 26

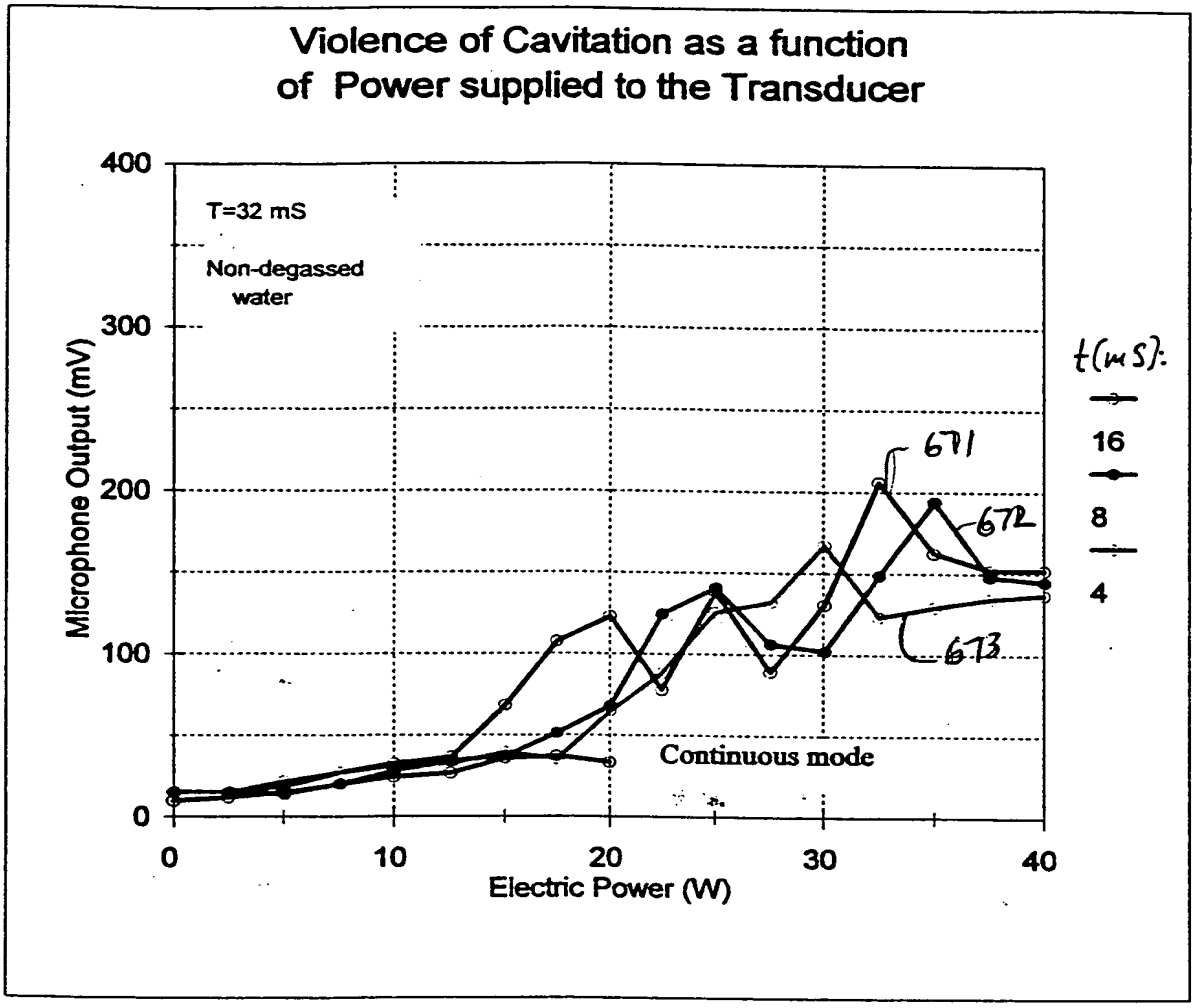
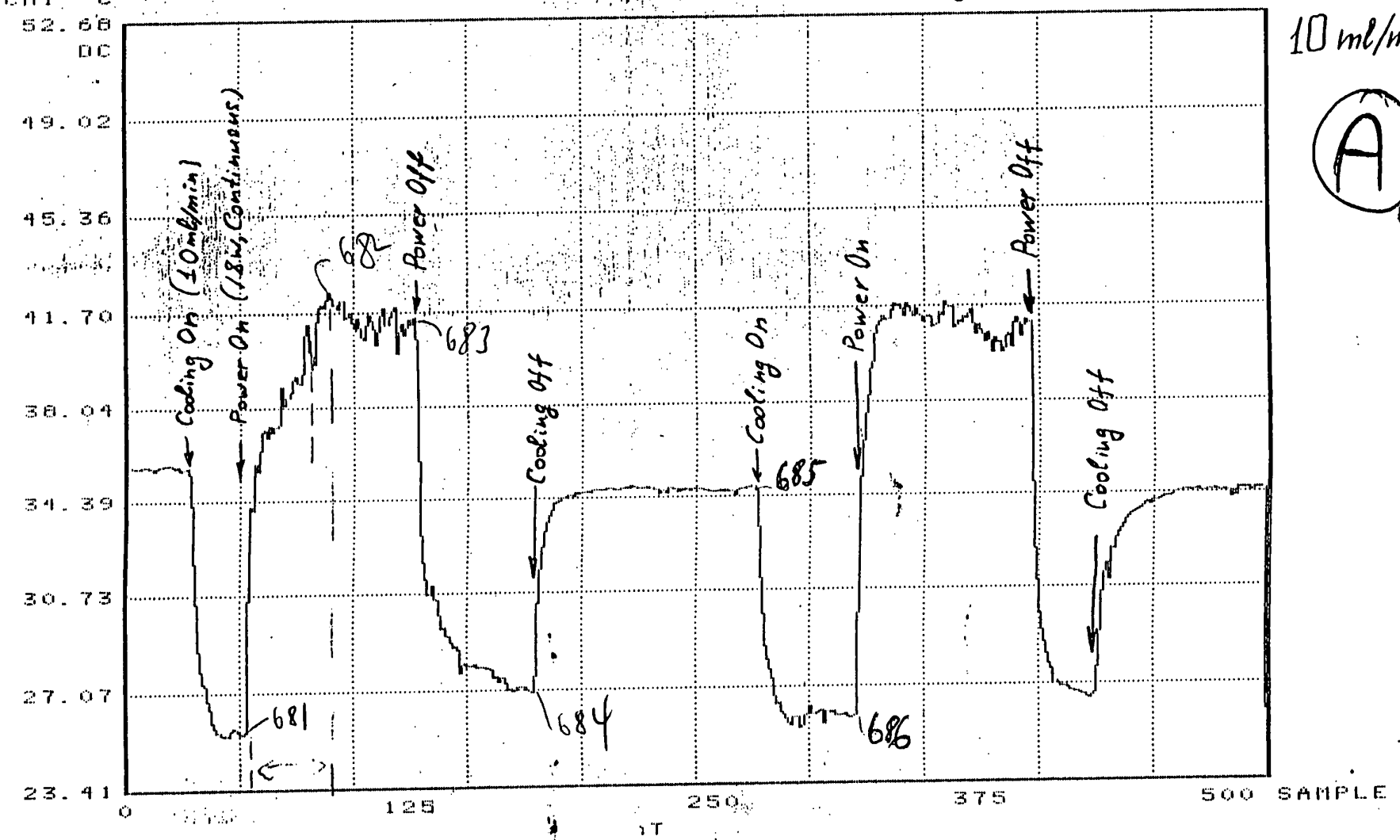

Violence of Cavitation as a function
of Power supplied to the Transducer
T=32 mS
Non-degassed
water
Microphone Output (mV)
400
300
200
100
0
0
10
20
30
40
Electric Power (W)
Continuous mode
671
672
673
t(mS):
16
8
4

FIG. 27

Place here your company name ..... Your tel. no. .....
Address ..... Your fax. no. .....
Town ..... Your telex no .....



SAMPLING TIME : 2.40 sec.
NO. OF SAMPLES: 3000

Continuous Wave 18 watt
10 ml/min

(A)

FIG. 28

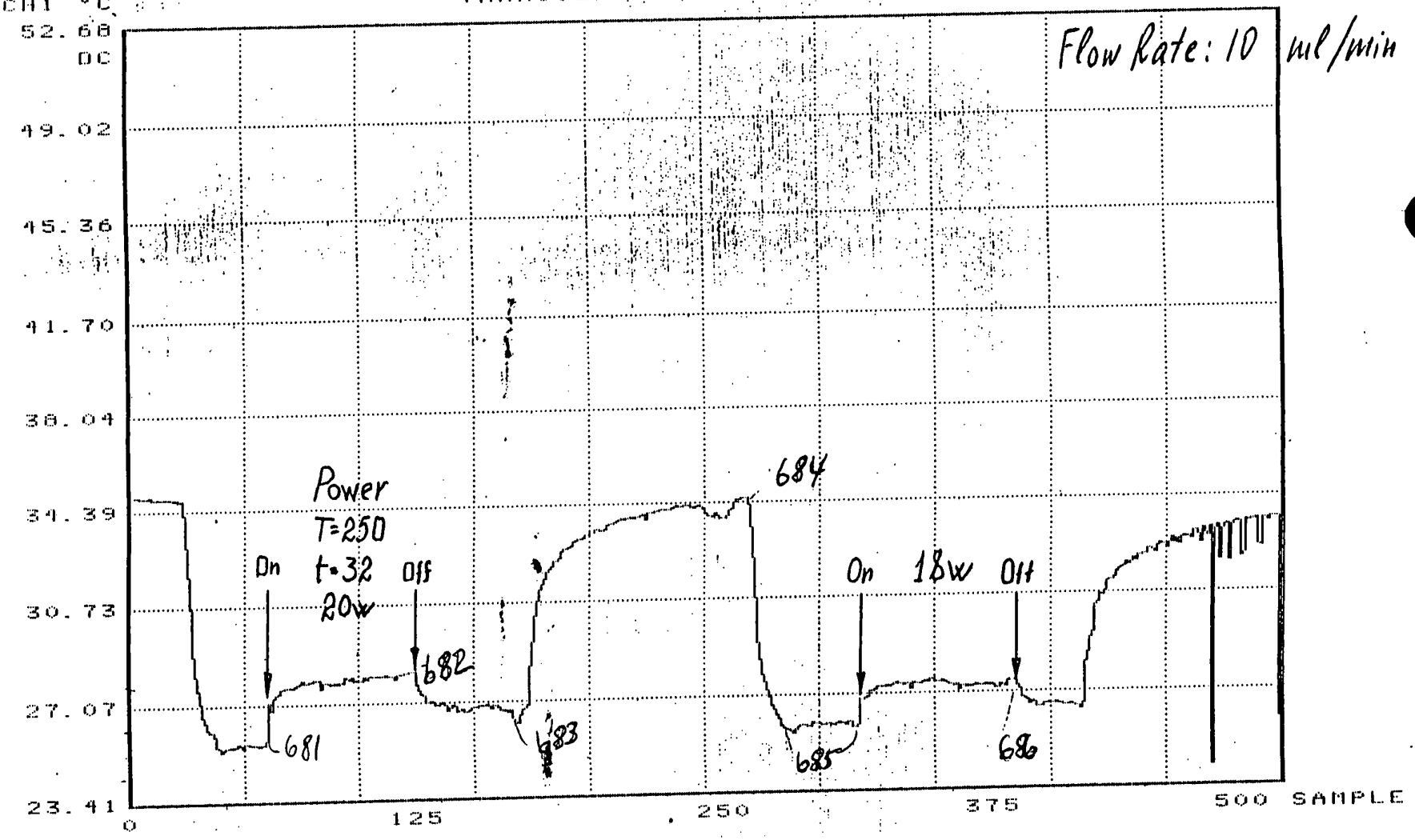
Place here your company name ..... your tel. no. .....
Address ..... your fax no. .....
Town ..... your telex no .....

De
Ti

Duty Cycle = 8 (32/250)

Flow Rate: 10 ml/min

TRANSIENT RECORDER CH 1



SAMPLING TIME : 2.40 sec.
NO. OF SAMPLES: 499

FIG. 29

Place here your company name .... your tel. no. .....
Address ..... your fax. no. .....
Town ..... your telex no .....

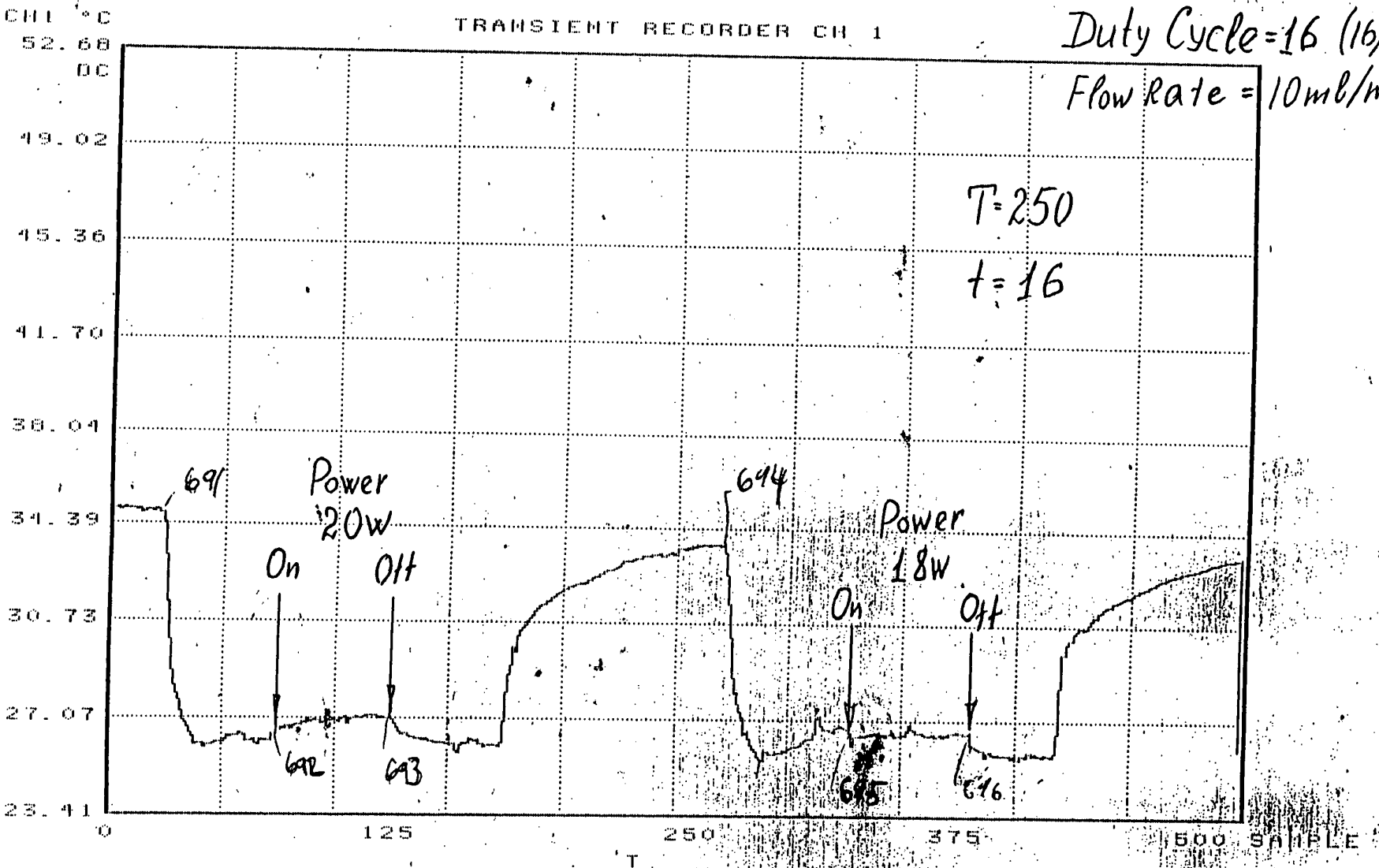


FIG 30